ISSUE 185 SEPTEMBER 2008

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Try the World's Fastest, Easiest Finish! p.28

Super Simple Solid Oak Bookcase p.60

Test: Best Bandsaws Under $550 p.54

3 Ingenious Shop Projects:

- Portable Workbench
- Drum sander
- Plug Trimmer

31 Time- and Money-Saving Shop Tips You Can Use *TODAY*

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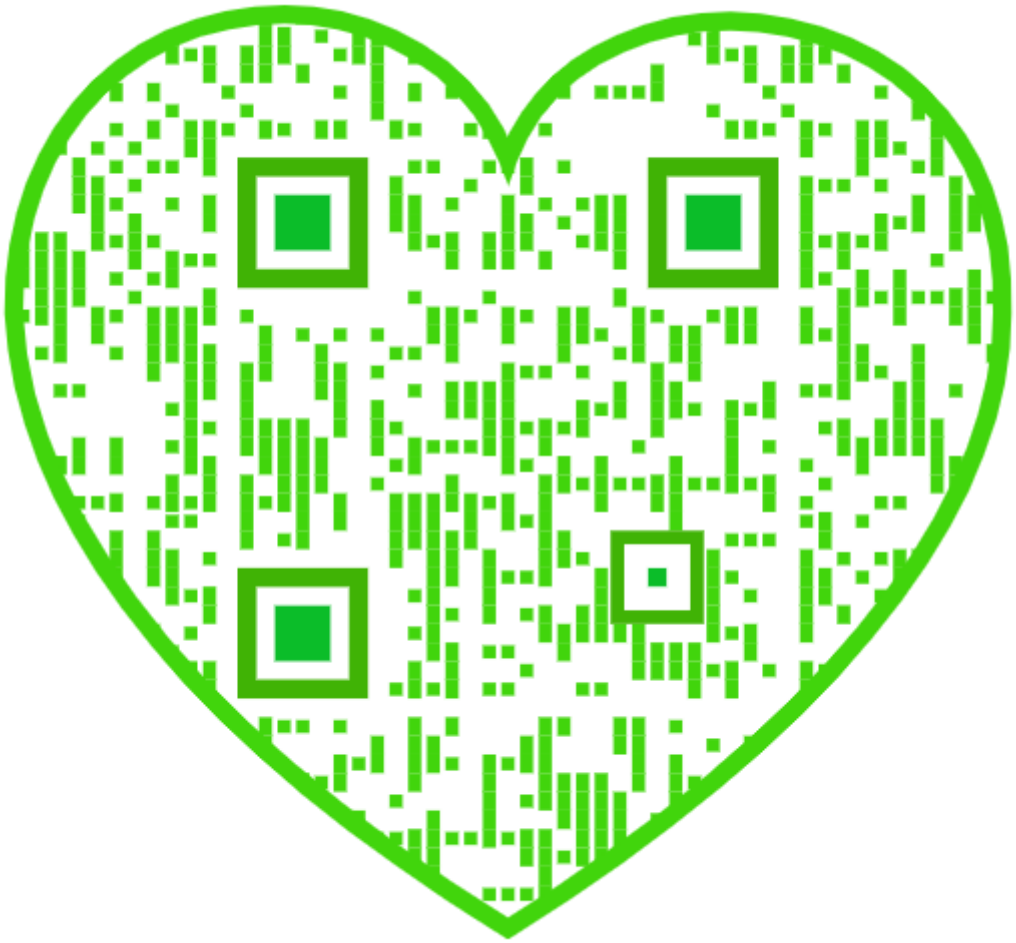

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Purveyors of Fine Machinery®

New! 10" Heavy-Duty Cabinet Table Saws *w/Riving Knife*

Perfect for cutting panels and wide stock!

- Motor: 3 HP, 220V, single-phase or 5 HP, 220V/440V*, 3-phase
- Precision ground cast iron table
- Table size w/extension: 27" x 75¾"
- Max. depth of cut: 3⅜" @ 90°, 2¼" @ 45°
- Arbor: ⅝"
- 52" rip capacity
- Approx. shipping weight: 514 lbs.

Riving Knife can be used with quick release guard!

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*440V OPERATION REQUIRES PURCHASE OF ADDITIONAL COMPONENTS. CALL TECH. SERVICE FOR MORE INFO.

G0651 3 HP, single-phase
INTRODUCTORY PRICE $1695.00

G0652 5 HP, 3-phase
INTRODUCTORY PRICE $1695.00

Includes 10" Blade!

See it on Page 23 of the 2008 Catalog.

$139 ANYWHERE IN LOWER 48 STATES

New! Heavy-Duty 17" Extreme Bandsaw *w/ Cast Iron Wheels*

Only Grizzly offers these features for this price!

Cast Iron Wheels & Trunnion

MADE IN ISO 9001 FACTORY!

See it on Page 97 of the 2008 Catalog.

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Larger precision ground cast iron table size: 24" x 17"
- Table tilt: 5° left, 45° right
- Max. cutting height: 12"
- 2 blade speeds: 1700 & 3500 FPM
- Double ball bearing blade guides
- Quick change blade release/tensioner
- Approx. shipping weight: 414 lbs.

Includes Deluxe Re-saw Fence, Miter Gauge & ½" Blade

G0513X2
INTRODUCTORY PRICE $950.00

$89 ANYWHERE IN LOWER 48 STATES

12" Baby Drum Sander

- Sanding motor: 1½ HP, 110V, single-phase
- Conveyor motor: 1/10 HP, 110V, single-phase, variable speed 0-15 FPM
- Drum surface speed: 2300 FPM
- Max. stock dimensions: 12" wide x 3½" thick
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" hook & loop
- Approx. shipping weight: 160 lbs.

SIDE HANDLES FOR PORTABILITY!

2 ADJUSTABLE PRESSURE ROLLERS & INDUSTRIAL-DUTY BELT

G0459
ONLY $650.00

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10" Left-Tilting Table Saws

w/Cast Iron Router Table

- Motor: 3 HP, 220V, single-phase or 5 HP, 220V, single-phase
- Precision ground cast iron table
- Table size w/wings attached: 27" x 48"
- Cutting capacity: 8" L, 26" R
- Approx. shipping weight: 500 lbs.

ROUTER AND WOOD NOT INCLUDED

G1023SLW
3 HP, single-phase
ONLY $1050.00

G1023SLWX
5 HP, single-phase
ONLY $1195.00

INCLUDES SHOP FOX® CLASSIC™ FENCE

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10" Left-Tilting Table Saw

w/7' Rails & Extension Table

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table
- Extension table size: 27" x 44"
- Arbor: ⅝" (accepts dado blades up to 13/16")
- Cutting capacity: 8" L, 54" R
- Max. depth of cut: 3" @ 90°, 2⅛" @ 45°
- Approx. shipping weight: 532 lbs.

54" Cutting Capacity!

INCLUDES SHOP FOX® CLASSIC™ FENCE & CAST IRON MITER GAUGE

WOOD MAGAZINE TOP VALUE APPROVED 2005

G1023SLX ONLY $1295.00

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19" Heavy-Duty Extreme Series® Bandsaw

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table
- Table size: 26¾" x 19" x 1½"
- Cutting capacity/throat: 18¼"
- Max. cutting height: 12"
- Blade size: 143" L (⅛" - 1¼" wide)
- 2 Blade speeds: 1700, 3500 FPM
- Approx. shipping weight: 458 lbs.

Includes Aluminum Re-saw Fence Attachment, Dual Ball Bearing Blade Guides, Cast Iron Wheels & Fence

MADE IN ISO 9001 FACTORY!

EXTREME SERIES

G0514X
ONLY $1150.00

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21" Super Heavy-Duty Bandsaws

w/Tilting Geared Table

- Motor: 3 HP or 5 HP, 220V, single-phase
- Precision ground cast iron table
- Table size: 29½" x 20¾" x 1⅞"
- Table tilt: 5° L, 45° R
- Cutting capacity/throat: 20"
- Max. cutting height: 14"
- Blade size: 165" long (¼" - 1⅜")
- Blade speed: 4600 FPM
- Approx. shipping weight: 684 lbs.

Includes 1" Blade, Cast Iron Wheels & Fence

G0566 3 HP
ONLY $1850.00

G0531 5 HP
ONLY $1895.00

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Professional Spindle Shapers

- Motor: 5 HP, 220V, single-phase, TEFC or 7½ HP, 220V/440V*, 3-phase
- Precision ground cast iron table size: 35½" x 28"
- Spindle sizes: ¾", 1" & 1¼" x 7½"
- Spindle speeds: 3600, 5100, 8000 & 10,000 RPM
- Spindle travel: 3¼"
- Max. cutter dia.: 5⅞"
- Approx. shipping weight: 602 lbs.

5 HP, SINGLE-PHASE
G5912Z ONLY $2195.00

7½ HP, 3-PHASE
G7214Z ONLY $2195.00

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New! 15" Planer w/Spiral Cutterhead

An unbeatable combination of stability, power, smoothness & mobility!

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron tables & extension wings
- Table size: 15" x 20"
- Max. cutting height: 8"
- Feed rate: 16 & 30 FPM
- Cutterhead speed: 5000 RPM
- 2 speed gearbox
- Magnetic safety switch
- Heavy-duty cast iron construction
- Approx. shipping weight: 675 lbs.

Foot Operated Built-in Mobile Base Provides Versatile Positioning

G0453Z INTRODUCTORY PRICE $1295.00

$139 ANYWHERE IN LOWER 48 STATES

See it on Page 57 of the 2008 Catalog.

New! 8" Jointer w/Spiral Cutterhead!

Versatile parallelogram table adjustment system!

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron tables
- Total table size: 8" x 76⅜"
- Infeed table size: 8" x 43⅜"
- 4 row spiral cutterhead
- Cutterhead speed: 5350 RPM
- Max. rabbeting depth: ½"
- Deluxe cast iron fence size: 35"L x 1¼"W x 5"H
- Approx. shipping weight: 597 lbs.

Extra Long Infeed Table & Extra Tall Fence

INCLUDES FREE SAFETY PUSH BLOCKS

EXTREME SERIES

G0490X INTRODUCTORY PRICE $1075.00

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See it on Page 41 of the 2008 Catalog.

20" Planer

- Motor: 5 HP, 220V, single-phase
- Table size: 20" x 25¾" (20" x 55⅝" w/ extension)
- Max. cutting width: 20"
- Max. cutting height: 8"
- Min. stock length: 7½"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 20 FPM
- Cutterhead dia.: 3⅛"
- Knives: 4 HSS
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 920 lbs.

Precision Ground Cast Iron Bed & Infeed/Outfeed Tables

G0454 ONLY $1295.00

$169 ANYWHERE IN LOWER 48 STATES

20" Extreme Series® Planer w/Spiral Cutterhead

- Motor: 5 HP, 220V, single-phase
- Precision ground cast iron table size: 20" x 25¾" (20" x 55⅞" w/ extension)
- Max. depth of cut: ⅛"
- Max cutting height: 8⅝"
- Cutterhead speed: 4800 RPM
- Feed rate: 16 & 20 FPM
- Approx. shipping weight: 909 lbs.

EXTREME SERIES

MADE IN ISO 9001 FACTORY!

G1033X ONLY $2395.00

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24" Professional Planers

- Cutterhead motor: 5 HP, 220V, single-phase or 7½ HP, 220V/440V*, 3-phase
- Feed motor: 2 HP
- Precision ground cast iron table size: 24⅛" x 31⅛"
- Max. cutting depth: ⅛"
- Max cutting height: 8"
- Feed rate: 17-26 FPM
- Cutterhead speed: 5200 RPM
- Knives: 4 HSS
- Approx. shipping weight: 1130 lbs.

Z SERIES

Variable Feed Speeds & Lever Adjustable Feed Rollers

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5 HP, SINGLE-PHASE

G5851Z ONLY $3795.00

7½ HP, 220V/440V*, 3-PHASE

G7213Z ONLY $3795.00

$250 ANYWHERE IN LOWER 48 STATES

12" x 83½" Parallelogram Jointer

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 12¾" x 83½"
- Cutterhead knives: (4) 12" x ⅛" 1⅞4"
- Cutterhead dia.: 3¾"
- Cutterhead speed: 4950 RPM
- Max.depth of cut: ⅛"
- Max. rabbeting capacity: ¾"
- Approx. shipping wt: 1036 lbs.

INCLUDES FREE SAFETY PUSH BLOCKS

Handles Fold In For Added Safety

G0609 ONLY $1595.00

$250 ANYWHERE IN LOWER 48 STATES

10" Extreme Series® Jointers

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 11" x 84"
- Max. depth of cut: ⅛" • Rabbeting capacity: ½"
- Cutterhead speed: 5000 RPM
- Cutterhead dia.: 3⅛6"
- Approx. shipping weight: 977 lbs.

Built Like a Tank w/ Heavy-Duty Cast Iron Base

EXTREME SERIES

4 BLADE CUTTERHEAD

G0455 ONLY $1695.00

SPIRAL CUTTERHEAD

G0480 ONLY $2095.00

$169 ANYWHERE IN LOWER 48 STATES

The Ultimate 12" Extreme Series® Jointers

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 12½" x 80"
- Center mounted fence: 4¾" x 39¼"
- Max. depth of cut: 5⁄16" • Bevel jointing: 90° - 45°
- Cutterhead dia.: 4"
- Cutterhead speed: 5900 RPM
- Approx. shipping weight: 1253 lbs.

G9860 INCLUDES FREE H2404 JOINTER PAL™ KNIFE SETTING JIG

EXTREME SERIES

MADE IN ISO 9001 FACTORY!

4 BLADE CUTTERHEAD

G9860 ONLY $3150.00

INCLUDES FREE SAFETY PUSH BLOCKS

SPIRAL CUTTERHEAD

G9860ZX ONLY $4150.00

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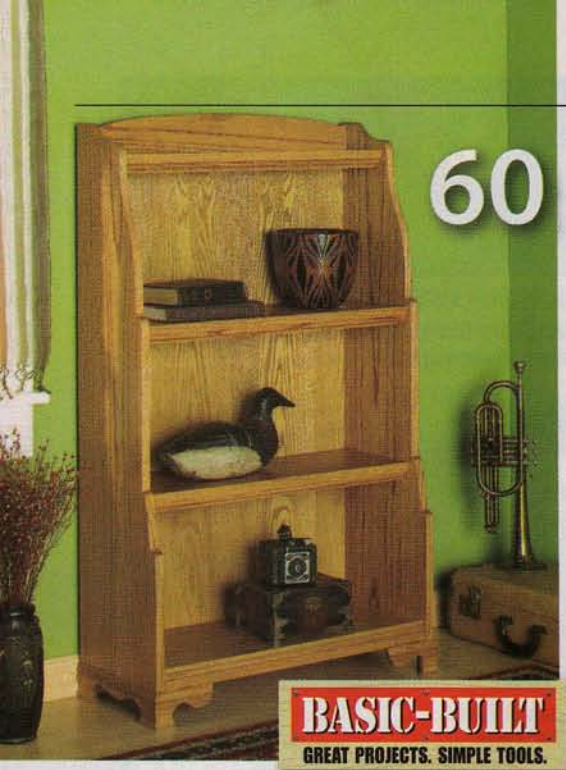

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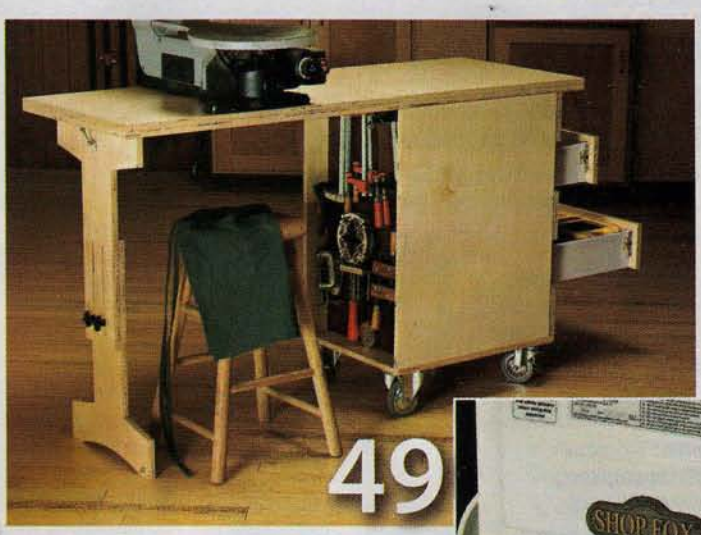

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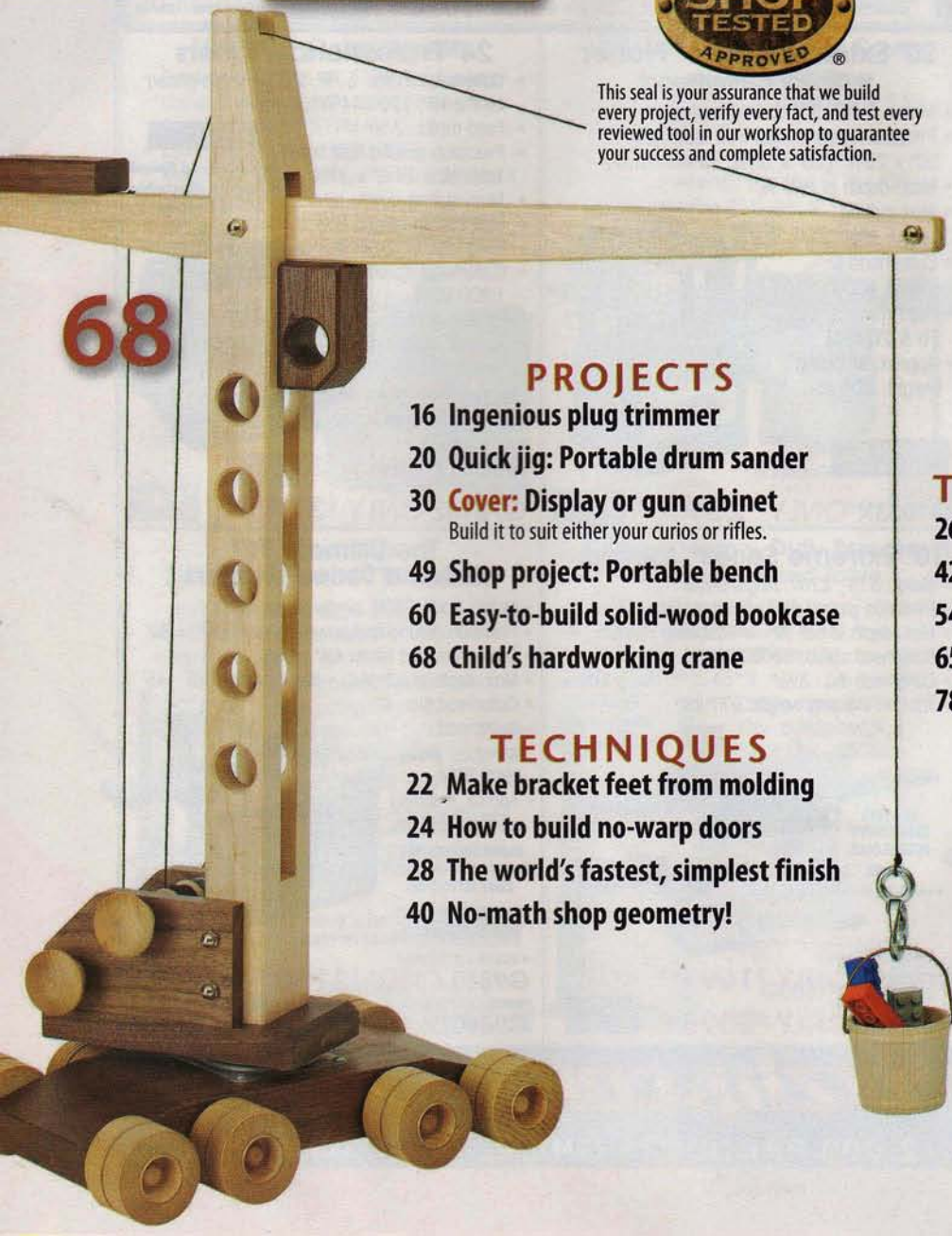
This seal is your assurance that we build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.



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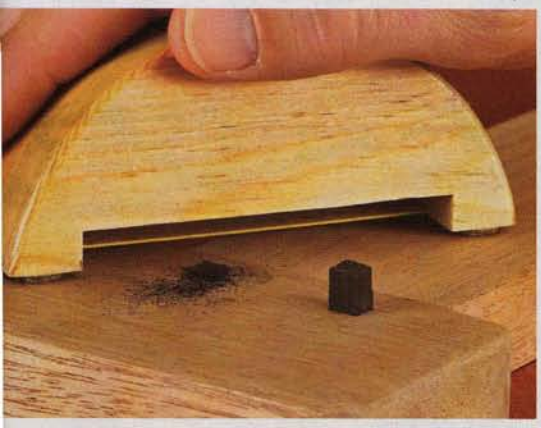
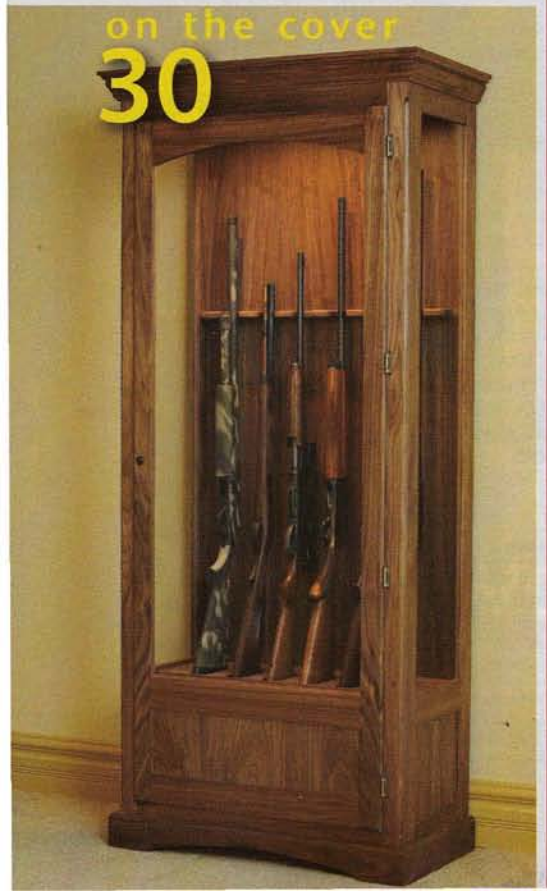


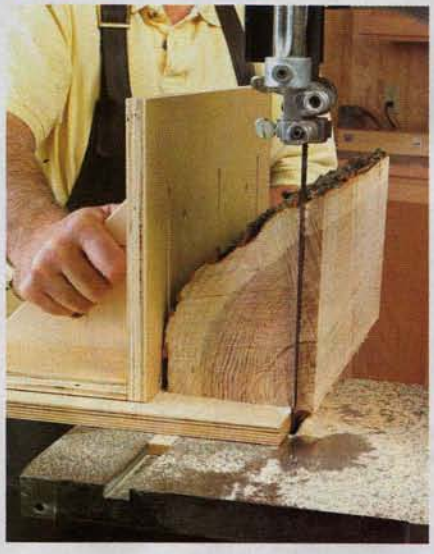


on the web
woodmagazine.com

EXTRA BANDSAW INFO ONLINE

This issue's bandsaw review on *page 54* is just the tip of the information iceberg. Also check out these FREE bandsaw-related items at WOOD Online:

- VIDEO: How to Install a Riser Block
  woodmagazine.com/riserblockvid
- VIDEO: Easy Bandsaw Blade Changes
  woodmagazine.com/bsbladevid
- VIDEO AND PLANS: Resawing Jig
  woodmagazine.com/resawvideo
- PLANS: Circle-cutting Jig
  woodmagazine.com/circlejig
- TECHNIQUE: Figuring Bandsaw Blade Length
  woodmagazine.com/bsbladelength



START YOUR GIFT "SHOPPING" EARLY

Heading into the shop to begin your holiday gift-building? Before you go, pop into the "Gifts, Clocks, and Boxes" photo gallery at woodmagazine.com/projectgallery. You'll find hundreds of inspiring reader-made projects, like this stunning jewelry box by Al Bibbero of Littleton, Colo.

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The *WOOD* e-Newsletter now delivers free project plans, Shop Tips, and alerts you to the newest Web freebies every week. It's free to sign up at woodmagazine.com/enews, and we promise not to clog your inbox with "special offers."

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September 2008 | **Vol. 25, No. 4** | **Issue No. 185**

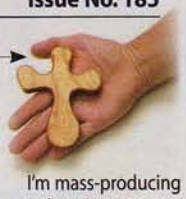
We asked our staff:

What are you working on in your shop, right now?

The baseboard and trim for a bathroom redo.

Raised garden beds built from composite decking materials (from the 2007 issue of *Best-Ever Decks and Backyard Projects*).

Rippling Ribbon Clock from issue 182.



I'm mass-producing palm crosses for a youth retreat program.

Bent laminated fenders for my bicycle, and I'm rebuilding a stairway newel post. Upcoming: radiator covers and a bookcase for my remodeled home office.

I'm remodeling my shop space and converting the existing knee walls to full-extension drawers to free up floor space. Next up: an Irish pub in my basement.

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In Memoriam — E.T. Meredith III (1933–2003)

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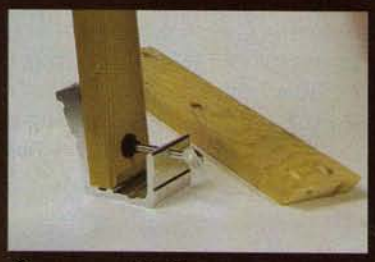
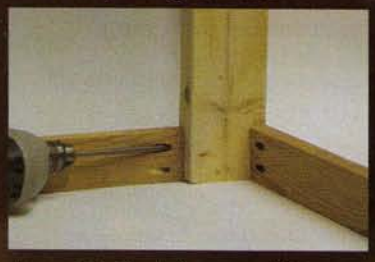


Clamp wood in jig

Drill into pre-aligned holes



Assemble flush & corner joints

Assemble angle joints

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Sounding Board

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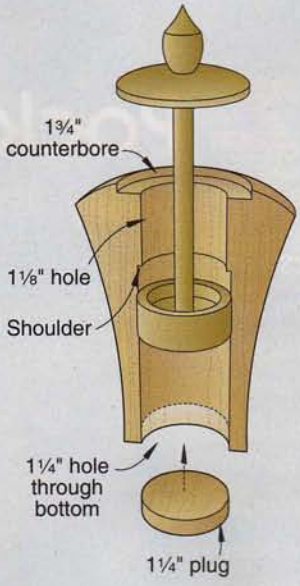
Shoulder prevents spilled toothpicks

As an intermediate woodturner, I found your toothpick dispenser on page 72 of issue 182 (March 2008) the perfect project for utilizing some attractive scrapwood. I turned mine, shown *below*, from glued-up maple and padauk, but I added a twist. To keep people from accidentally pulling the cup too far out and spilling the toothpicks, I made a shoulder inside the cylinder to act as a stop, as shown in the drawing at *right*. To do this I bored a 1¼" hole from the bottom, stopping about ¾" from the top. Then I bored a 1⅛" hole from the top. After inserting the cup into the cylinder, I glued a plug in the bottom.

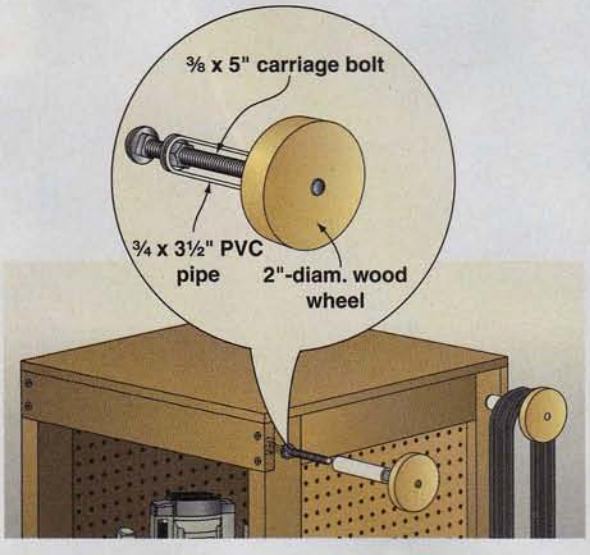
— Frank Pickett, Tucson, Ariz.



Protect power cords with PVC sleeves

I urge your readers to make one modification to the electric cord storage tip on page 10 of issue 183 (May 2008). As a licensed electrician, I worry that wrapping cords around bare bolt threads could, over time, damage the insulation—possibly resulting in shock. Instead, slip a short length of ¾" PVC pipe over the bolt for the cord to rest on.

— Charles Tubbs, Murray, Ky.



Tool handles: An ideal project for novice turners

When I read the article on the 4-in-1 Turned Handle Screwdriver in issue 180 (November 2007, pages 72–74), I knew you wrote it for me. I'm still relatively new to woodworking, so I don't have many tools, and I'm still honing my skills. This project helped me with both. I've made 15 so far, keeping one for my shop and giving the others as Christmas gifts. I made the handles from various combinations of ash, purpleheart, and wenge. Thanks for the fun project.

—Dave Rector, Denham Springs, La.

Another great way to store back issues

To follow up on your "Smart Ways to Store *WOOD* Magazine" article in issue 177 (July 2007), I offer one more solution: I take the metal splines from file-cabinet hanging folders and insert them into the center spreads of the magazines. Then I hang them in my filing cabinet drawer for convenient, dust-free storage.

—Mark Wile, Marietta, Ohio

HOW TO REACH US

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Free videos help you learn valuable techniques

I want to compliment the staff of *WOOD*® magazine for the free videos available at woodmagazine.com/videos. I've been impressed by the quality and content of these videos, especially for subjects that are hard to find on for-sale videos. As a beginning woodturner, I've learned an incredible number of techniques and tips from Brian Simmons, shown *left*. A video paired with a magazine article really helps me see and understand what you're teaching. Thanks!

—Pieter DeHaan, Somerset, N.J.

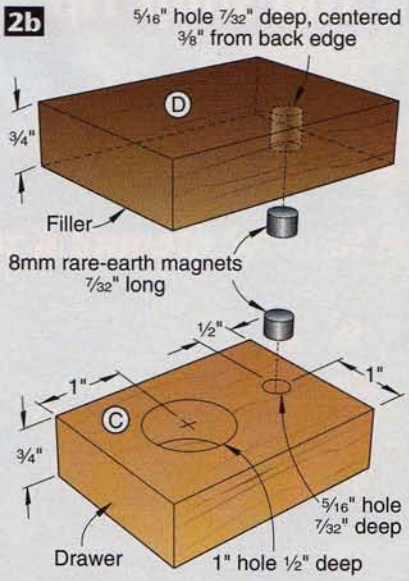
Article updates

Issue 182 (March 2008)

■ In the article "A Perfect Puzzler," the locations of the two magnet holes in the Caged Dove puzzle box are transposed. Here are the correct instructions for **Step 4** in the middle column on page 35, along with an updated **Drawing 2b**:

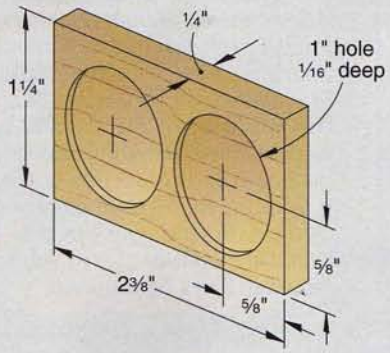
4 Flip the drawer (C) end-for-end and, using a 5/16" Forstner bit, drill a hole centered 1/2" from the back edge and as deep as the rare-earth magnet is thick. In the filler (D), bore another magnet hole the same size and depth centered 3/8" from the back edge. (Perry offsets the holes by 1/8" so the magnets hold the drawer in place.)

2b



Issue 184 (July 2008)

■ In the *WOOD Patterns*® insert on *page 47*, you'll find the zebra and rhino patterns which were excluded from the insert in issue 184.



Issue 184 (July 2008)

■ Here are the dimensions for the District of Columbia and U.S. Territories coin holders on page 10.

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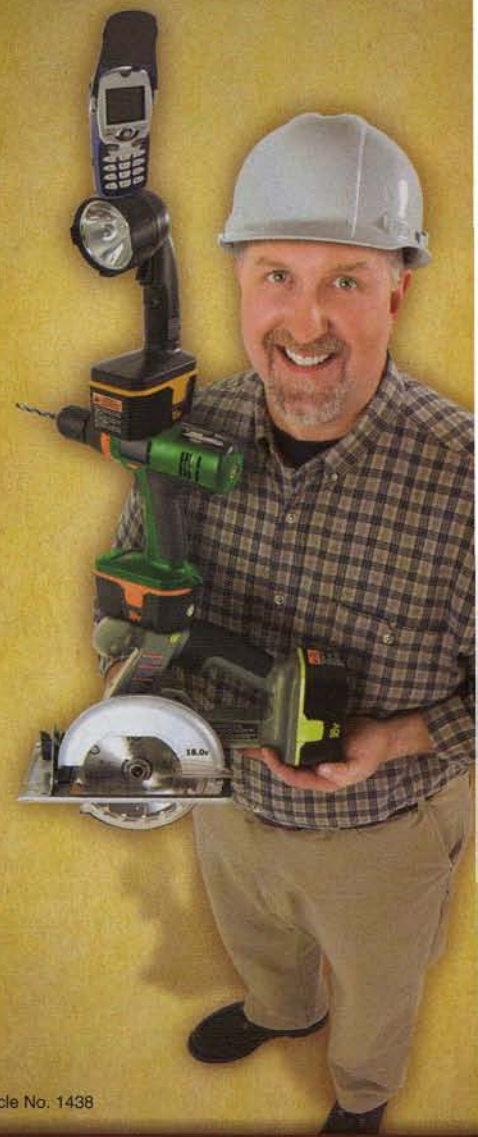

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Shop Tips

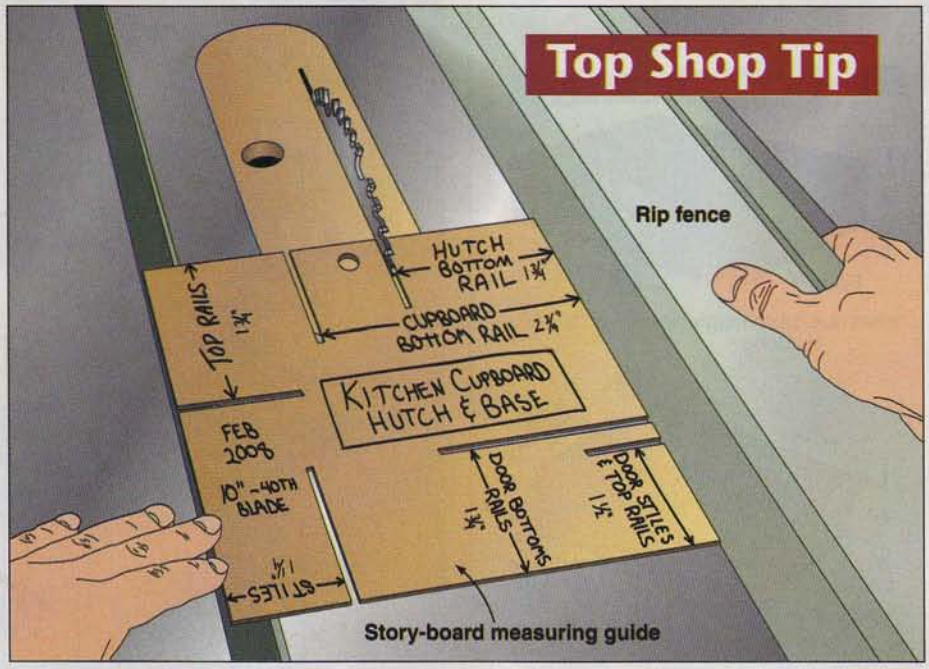
Helping you work faster, smarter, and safer

Simple story board makes fence setup a snap

A story stick is a great way to set up your tablesaw fence accurately without measuring every time. But sometimes, measurements too near each other can be hard to mark and read reliably. My solution: Create a story "board" out of a scrap of ⅛" hardboard. For every fence setup, after I cut my workpieces, I make a short cut on the story board, and write in the measurement and the name of the part. That way, if I forget to cut a piece or have to make a re-cut, it is simple to capture the blade in the story board and slide the fence into place against the story board, as shown *below*.

To make the story board even more reliable, I record information on it such as the date, the blade used, even the name of the piece of furniture. I store all of my story boards on a nail on a rafter for those times when my friends and family ask, "Can you make me one just like it?"

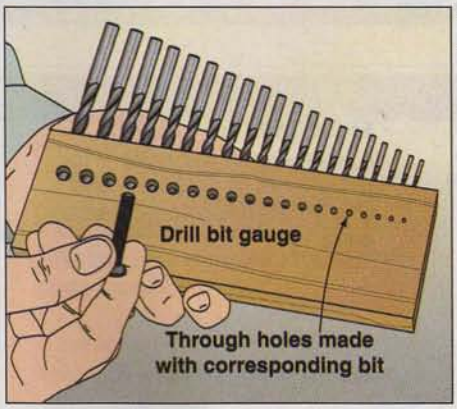
—Serge Duclos, Delson, Que.



Never miss a bit with combination holder and gauge

Finding the right bit for bolts, dowels, or other hardware couldn't be easier with the combination drill-bit holder and gauge that I made. I simply drilled holes into the edge of a hardwood scrap to hold each bit. Then I drilled gauge holes of the same size through the face of the holder centered on the bit holes. The bits block the gauge holes, but I can quickly slide bits out of their holes to fit a piece of hardware through the gauge holes. When the hardware fits the hole, the bit in my hand is the winner.

—Rick Hutcheson, Grimes, Iowa



continued on page 10

The Top Tipster

Photo: Ximena Griscti Photography

Retired civil servant Serge Duclos is a self-proclaimed tool nut. His basement shop holds two tablesaws, three drill presses, three mitersaws, and countless shop-made jigs. He made us promise not to tell you how many routers he has in his collection, but the number falls somewhere between 16 and 18. That includes the first router he ever bought more than 30 years ago, which currently serves in a dedicated chamfering station.

We're with you, Serge! A shop can never have too many tools. So here's the 75-050T benchtop mortiser from General International to add to your collection.

Top tips earn tools!

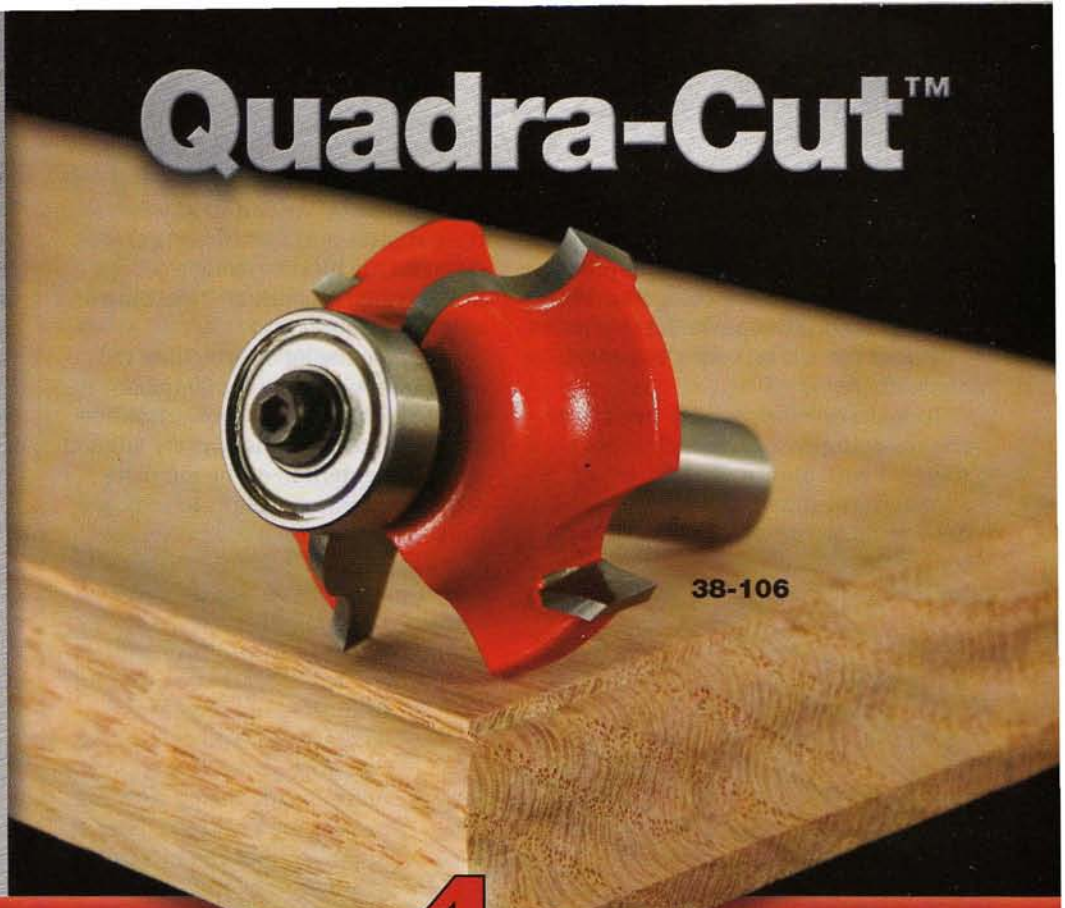
Tell us how you've solved a workshop stumper. If we print it, you'll get $100 and a copy of *450+ Best-Ever Shop Tips* (woodmagazine.com/450tips). And, if your idea garners Top Shop Tip honors, we'll also reward you with a tool prize worth at least $300.

Send your best ideas, along with photos or drawings and your daytime phone number, to: **Shop Tips, WOOD Magazine, 1716 Locust St., LS-221, Des Moines, IA 50309-3023**. Or, by e-mail: shoptips@woodmagazine.com. Include your contact info in the e-mail.

Because we try to publish original tips, please send your tips only to *WOOD*® magazine. Sorry, submitted materials can't be returned.

What's The Secret To Flawless Edge Profiles With NO REWORK?

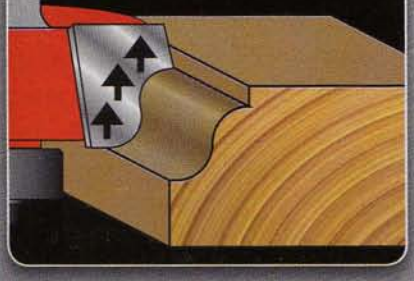
Quadra-Cut™



Freud's New Quadra-Cut™ 4 Cutter Design

How It Works!

Two large cutter wings shear upward to remove most of the stock for fast, extremely smooth cuts.



Two small cutter wings shear downward for an ultra-fine finish, even when routing crossgrain in delicate materials!

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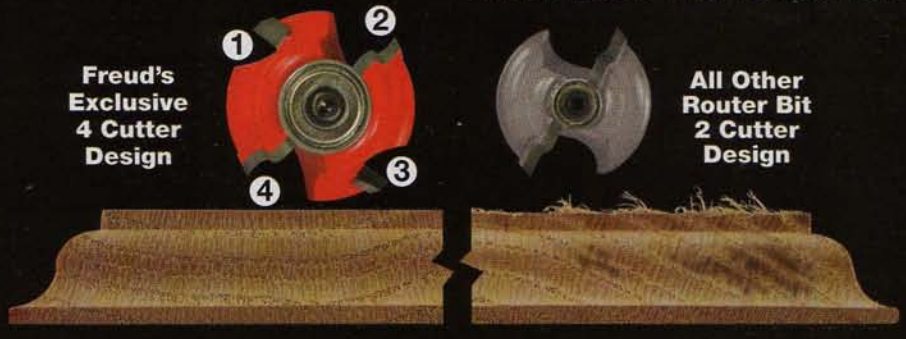

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"Super-smooth cuts!"
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- Beading Bit, 5/16" Radius
- Beading Bit, 1-1/8" Radius
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- Table Edge Bit
- Rounding Over Bit, 5/8" Radius
- Rounding Over Bit, 1-1/2" Radius
- Raised Panel Bits

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Take the plunge with this self-centering mortising jig

Recently, I constructed a panel door using floating tenons to join the stiles and rails. This method requires precise positioning of two opposing mortises for each tenon. To ensure the alignment, I devised the self-centering mortising jig shown here.

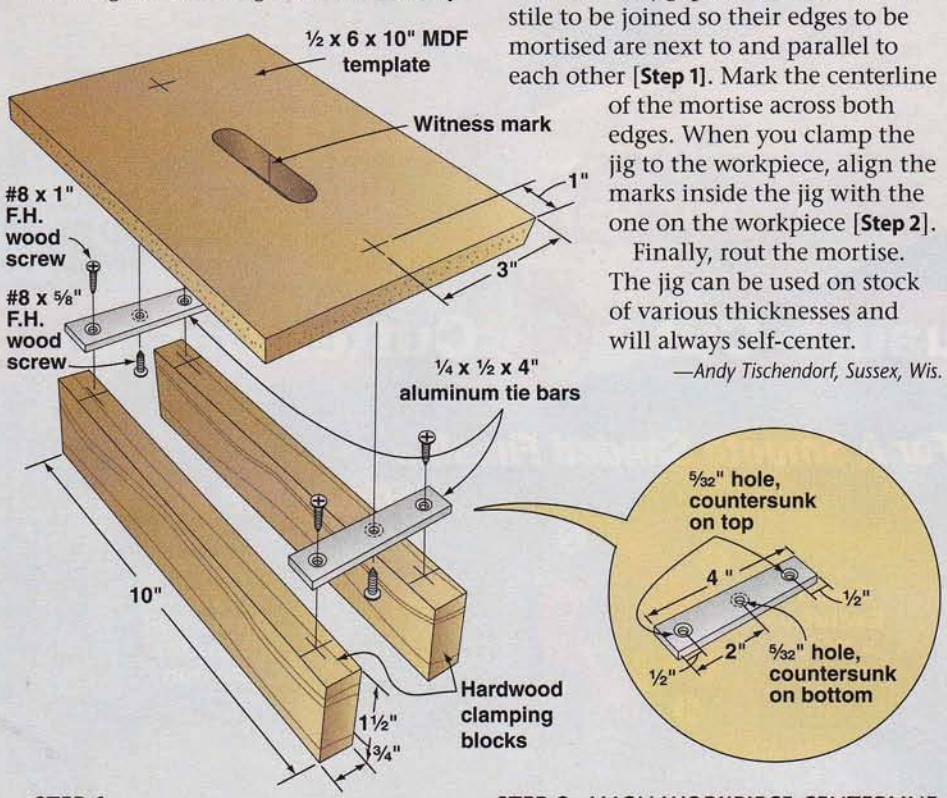
To make one for yourself, begin with the clamping portion, which is held together with aluminum tie bars, as shown in the drawing. The slot in the MDF template should be ¼" wider and longer than the desired mortise to allow for the guide bushing. For instance, my tenons were ½" thick and 3" wide, so the template hole measured ¾×3¼". (I routed my mortise using a plunge router equipped with a ¾" bushing and a ½" upcut spiral bit.)

Assemble the jig by attaching the clamping portion to the template, being careful that the screws holding the template to the tie bars are aligned with the centerline of the template slot. Pencil witness marks to indicate the center of the mortise inside both edges of the slot.

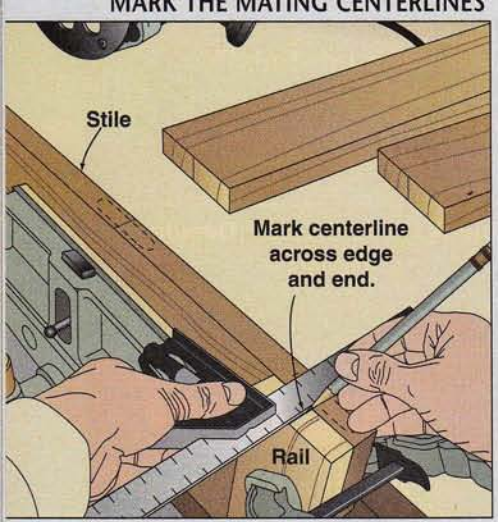
To use the jig, position the rail and stile to be joined so their edges to be mortised are next to and parallel to each other [**Step 1**]. Mark the centerline of the mortise across both edges. When you clamp the jig to the workpiece, align the marks inside the jig with the one on the workpiece [**Step 2**].

Finally, rout the mortise. The jig can be used on stock of various thicknesses and will always self-center.

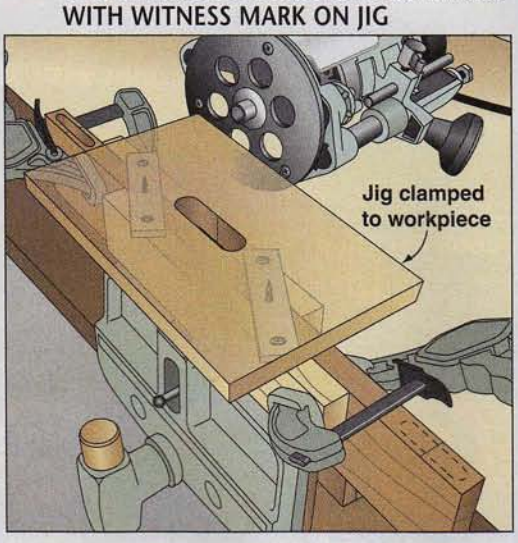
—Andy Tischendorf, Sussex, Wis.



STEP 1: MARK THE MATING CENTERLINES



STEP 2: ALIGN WORKPIECE CENTERLINE WITH WITNESS MARK ON JIG



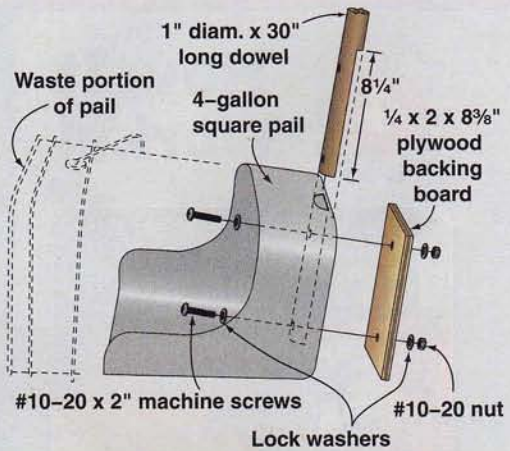
Back-saving dustpan for pennies

This stand-up dustpan, made from salvaged parts, is easy on both your back and wallet. Cut the body of the dustpan from a square-bottom, plastic pail used for everything from cat litter to bulk food items. (You can often get free ones from doughnut shops, delis, bakeries, and restaurants.)

The plywood backer prevents the fasteners from pulling through and protects the plastic from fatigue. The handle for my dustpan came from a broken snow shovel, but any handle or dowel will work. After cutting the handle to length, use your bandsaw to cut a ¼"-deep × 8¼"-long slice from one of the ends.

Mark and cut the pail to the profile shown, using either a pair of snips or a rotary tool with a general purpose cutting bit (such as Dremel 561 Multi-Purpose Cutting Bit). Sand a bevel on the leading edge of the pan for easy dust sweep-up.

—Raj Chaudhry, New York



Simple system for marking square on big panels

Marking a square end on a large panel can pose a sizable challenge, especially if you can't trust your framing square to be perfectly square. The simple system shown here will allow you to accurately mark panels with your framing square.

Before marking, rip your panel to width on the tablesaw so both edges are parallel. Next, mark the center of the panel across its width.

With your square held against one edge, make a mark at the edge (Point A) and across the center mark to form a crosshatch. Flip the square to the opposite edge, aligning it with the center crosshatch, and mark the edge (Point B).

Using a straightedge, draw a line between points A and B. Measure from this line or cut along it for a square end. Because the sides are parallel and you marked from the center, even an out-of-true square will ensure a square cut.

—Don Klimesh, Sylvania, Ohio

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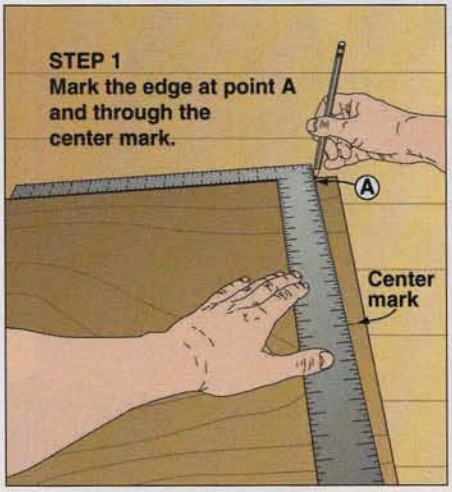

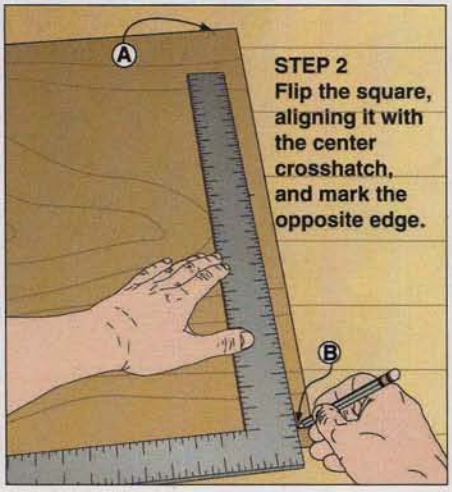

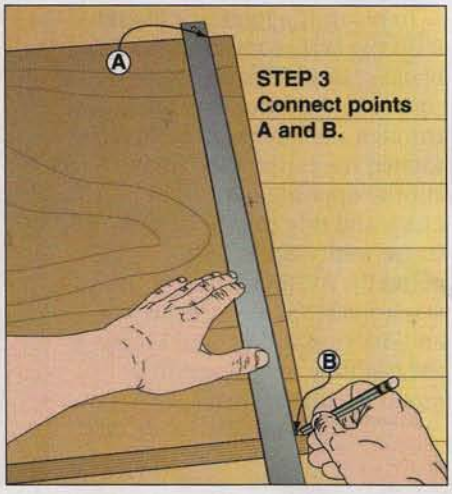

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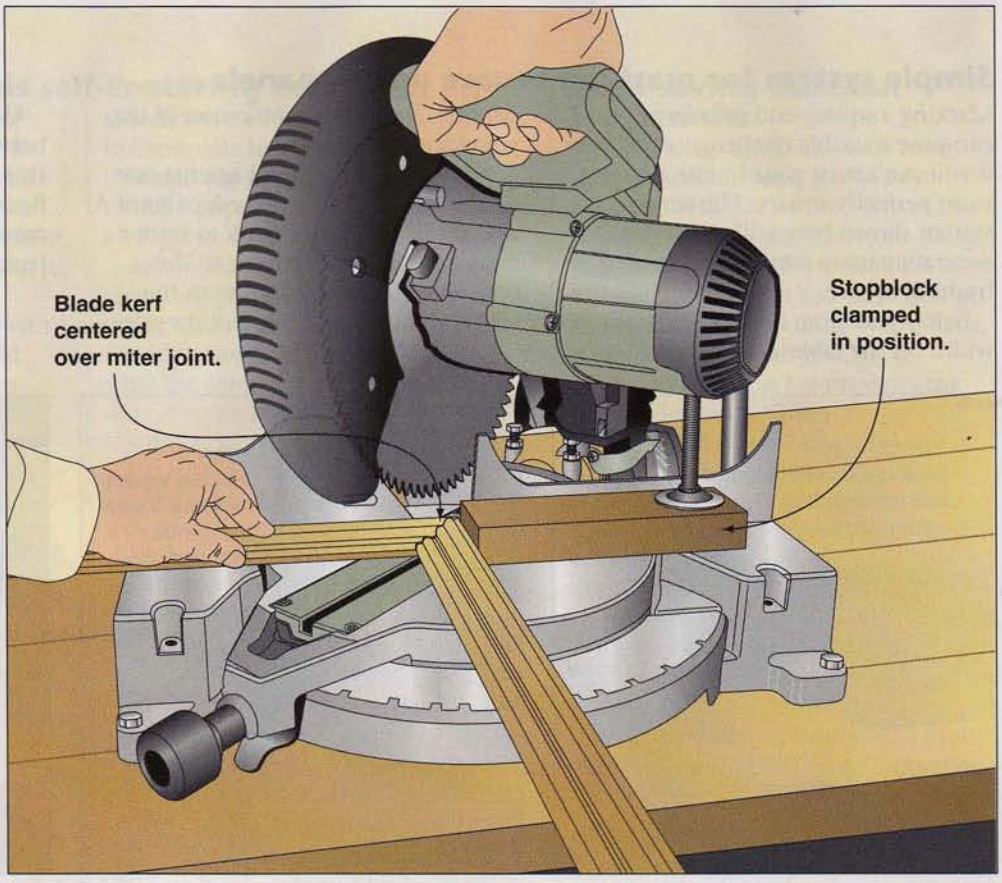
Circle No. 1520

One miter mistake you can make disappear

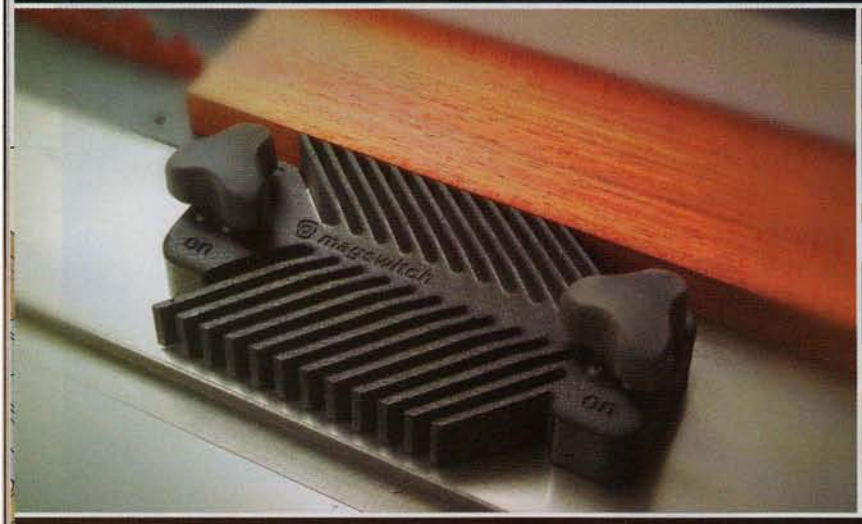
I built three picture frames for retirement gifts, but just as I was about ready to present them, I noticed that one joint had apparently slipped in the clamp and was partially open. Feeling a bit desperate, I performed a quick fix that saved me considerable embarrassment.

To repair the joint, I centered it on the kerf of my mitersaw blade, clamped a stopblock square to the fence, and cut through the faulty joint. Next, I rotated the frame 180° and re-cut the opposite joint. With a quick and tidy clamp-up, the frame went back together perfectly. Although the frame was a shade smaller, the glass and matting still fit, and I made the deadline with work I was proud to call my own.

—Jim Culler, Bellville, Ohio



Changing the way things are done.



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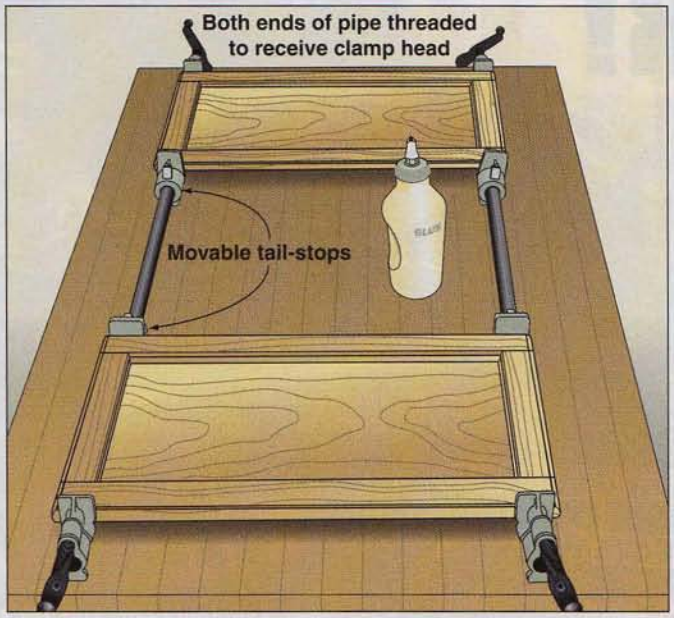
Circle No. 2016

Double-duty from long pipe clamps

I often run out of properly sized pipe clamps any time I have a project with more than a few doors to glue up. Rather than spread the gluing stage over several days, I added an extra clamp head and tail-stop to each, as shown. (You may have to have your pipes threaded on the other end at your local plumbing store). Now, they do double-duty, letting me glue up two doors at once.

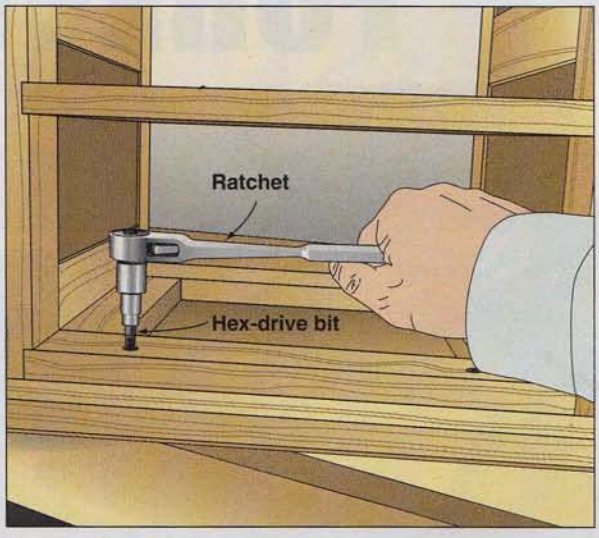
—Dewayne Ketchell, Roy, Utah



A right-angle driver at a just-right price: Free

If you've ever priced a right-angle screw gun, you know it's a lot of money for a tool most of us won't use very often. Fortunately, all of those hex-drive bits fit snugly into a ¼" socket, meaning the ratchet you probably already own serves as a solid substitute when you need to drive a screw in a tight spot.

—Robert Erwin, North Port, Fla.



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Circle No. 802

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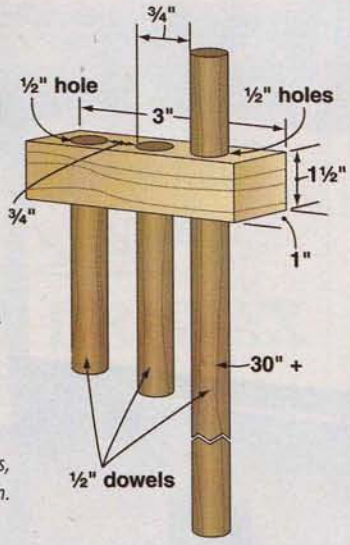
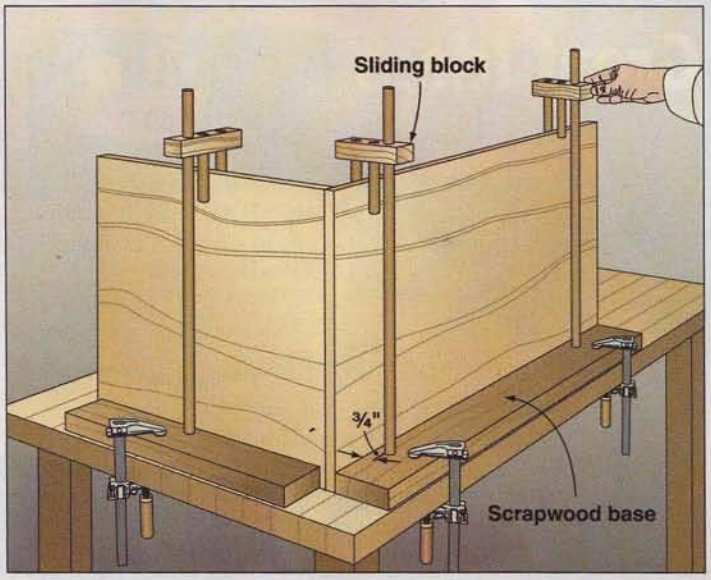
Circle No. 1846

Wooden fingers lend a helping hand

When building cases, I often find that nature did not provide me with enough hands, so I made my own "wooden fingers." These fingers slide down on a long dowel to steady large wooden panels for glue-up or joinery. And they leave the corners completely unobstructed for driving screws or nails.

—Ralph Roberts, Thompsonville, Mich.

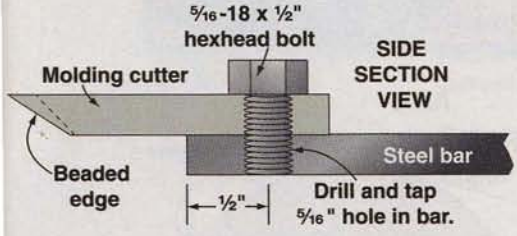


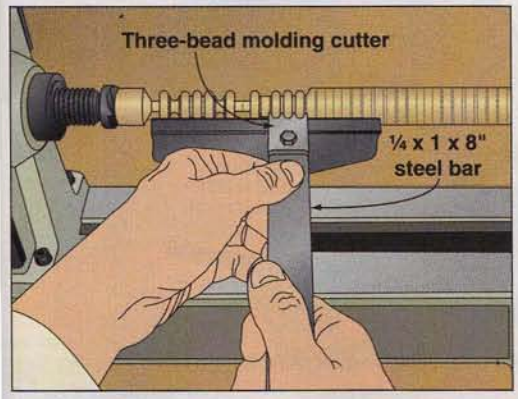


Complex spindles from simple cutters

I'm not a master at the lathe, so when a project required multiple spindles with adjacent beads, I needed a solution for turning them out quickly and accurately. That's when I remembered the three-bead cutter bit (model no. 23305, craftsman.com) for my Craftsman tablesaw molding cutterhead. Bolted to a piece of ¼×1×8" steel bar, it became a bead scraper that helped me turn out a couple of dozen identically beaded spindles in no time. With the wide variety of cutter profiles available, I can turn any number of complex shapes, and look like a pro in the process.

—Bob Sandefur, Loxahatchee, Fla.





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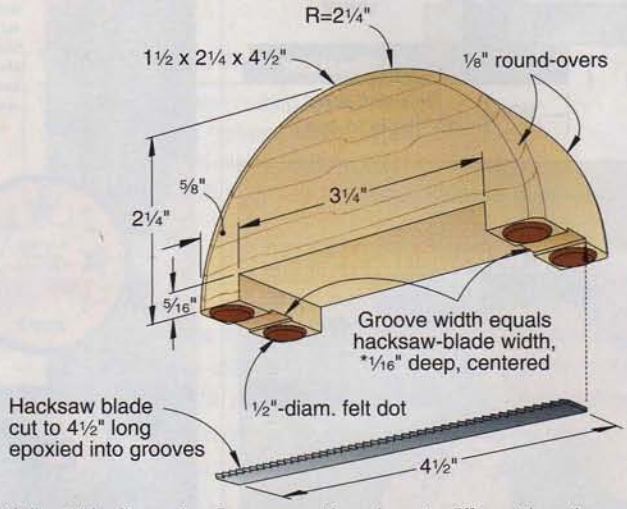
For trimming dowels from edge joints, as shown in the inset *above right*, clamp on a pair of scrap supports to create a larger flat surface for the jig to ride on.

Project design: **Dale Toms, Bedford, Va.**



*Adjust this dimension for crosscutting plugs to different lengths.

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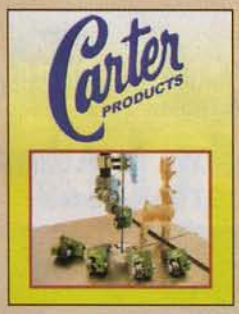

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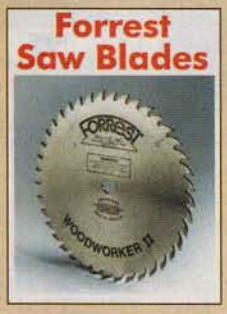

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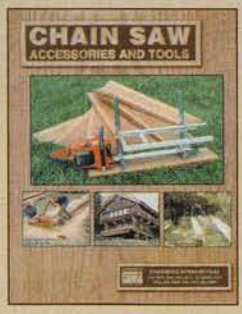

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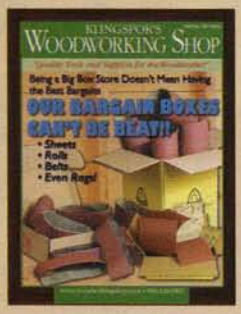

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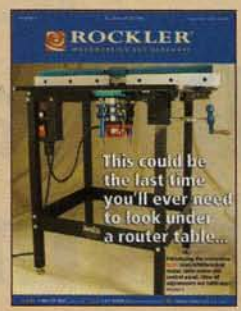

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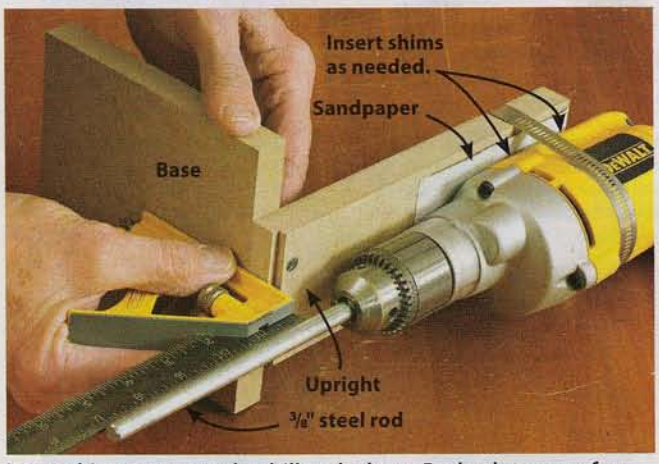
A sanding drum makes quick work of smoothing an edge profile rough-cut with a jigsaw. You might think you need a drill press or spindle sander to keep the sanded edges square to the surface, but a corded electric drill, shop scraps, a few dollars' worth of hardware, and a set of inexpensive sanding drums will do the trick. Even if you own a drill press or spindle sander, you'll find this jig handy for sanding a part too large to handle on one of those machines. A few minutes is all it takes to make this simple edge sander. Here's how.

Build the jig

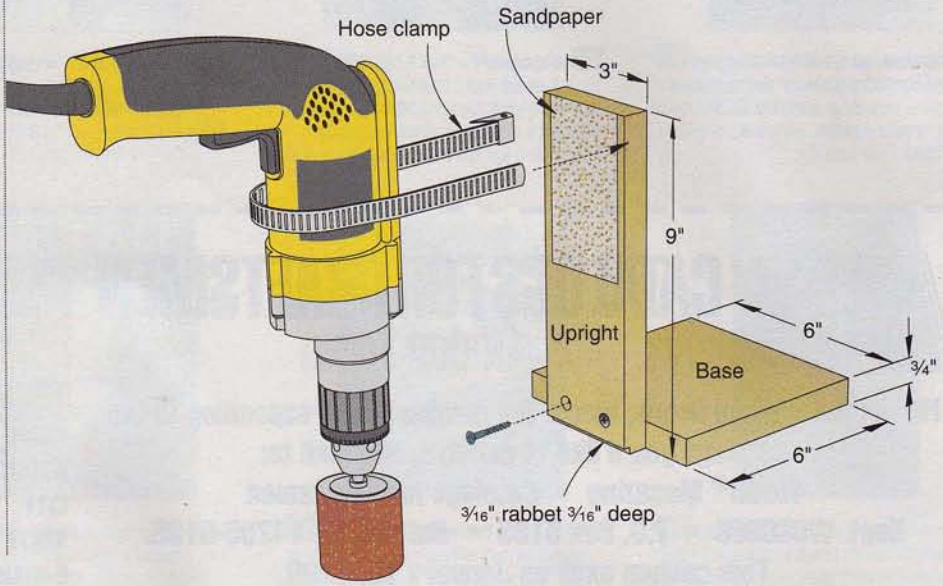
Cut the base and upright to the sizes shown at *right*. To accommodate large sanding drums, cut a rabbet along the bottom edge of the upright. Then clamp the parts together, drill screw holes, and drive the screws. To help keep the drill from shifting, adhere sandpaper to the upright. Strap your drill to the upright with a large-diameter hose clamp. Chuck a piece of ⅜" steel rod into the drill, and check for square, as shown at *center*. Make adjustments by inserting shims between the drill and the upright.

Using the jig

Chuck a sanding drum into the drill so the top edge of the drum is about ⅛" above the bottom surface of the base. Press the base flat against the workpiece. Lock the drill trigger into the on position, and guide the sanding drum along the edge. To reduce chatter, use a large sanding drum on broad curves. Switch to a smaller-diameter drum for tight inside curves.



Insert shims to square the drill to the base. Recheck square after you tighten the hose clamp securely.



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"[Forrest blades] cut true, with no vibration. I was a carpenter by trade for over 60 years and continue to be an active woodworker. So, I can say with confidence that Forrest blades are the best."
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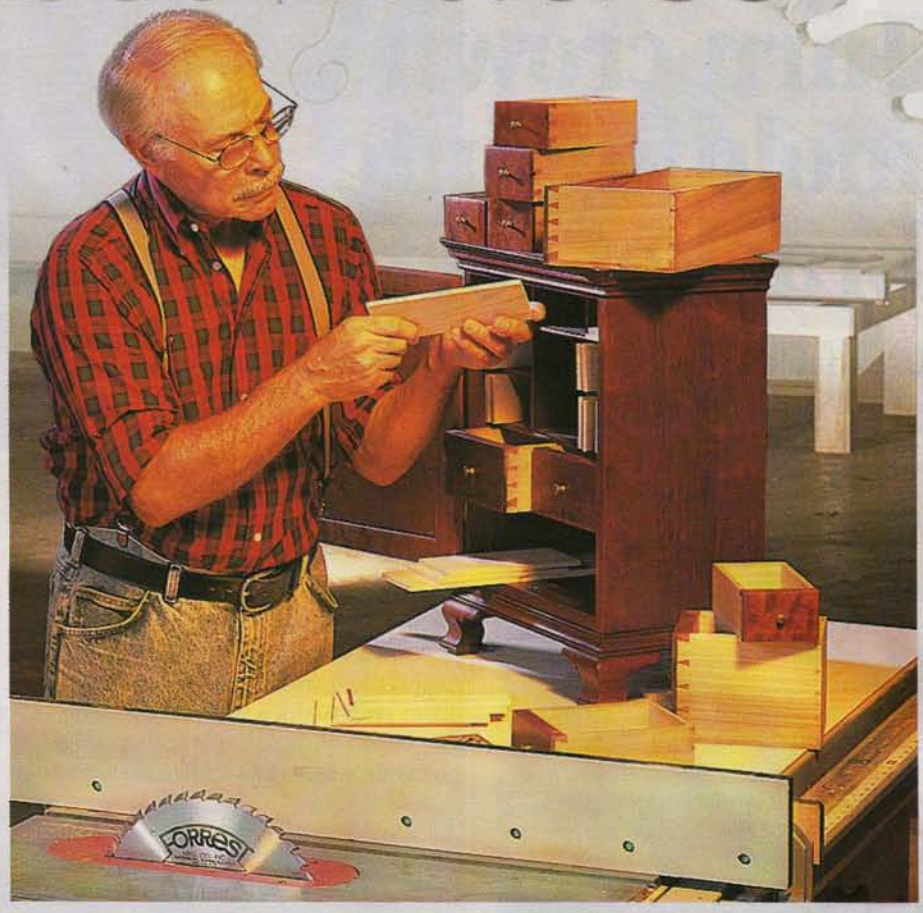

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Turn crown molding into bracket feet

Use a tablesaw and jigsaw to transform store-bought trim into a customized foundation for your next cabinet.

Two quick cuts on your tablesaw can turn common crown molding into bracket feet for bookcases, cabinets, and display cases.

First, decide what height of molding brackets will look best for the overall size of your project. For example, 4⅛"-wide moldings work on tall cabinets while 3⅛"-wide molding complements the midsize bookcase on *page 60*.

Foot sizes vary by molding

Moldings follow industry-standard widths and profiles, but vary in thickness. The thinner the molding, the narrower the back bevels you'll remove and the taller the foot. To see how much height a crown-molding foot will add to your project, measure between the bevels on the back.

You also can narrow the bracket feet and alter their profiles by ripping the molding at different locations. Taking just the section between the top and bottom ridges in the profile (the green and black lines in **Photo A**) gives you a 2⅞" blank from the wide crown, a 2³⁄₁₆"-wide blank from the medium, and a 1¼" blank from the narrow crown.

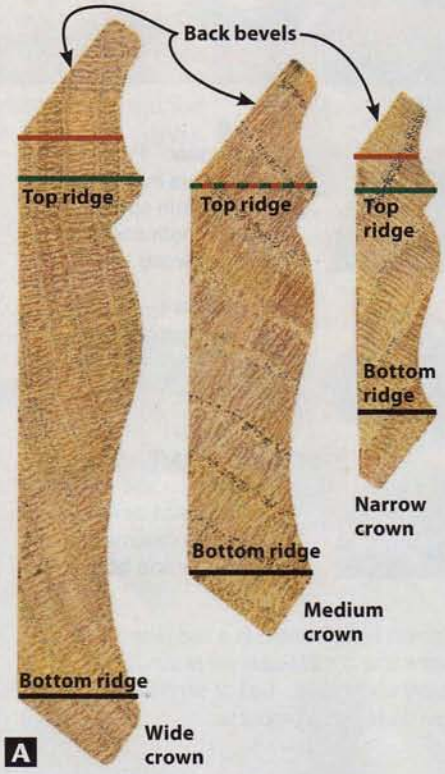
And nothing says you can't make the bracket feet with the profile turned upside down from how it's shown here.

Cut and miter the blanks

After you choose a crown molding style, set your tablesaw fence to remove the first inside bevel **[Drawing 1]**. Then reset the fence and cut away the opposite inside bevel.

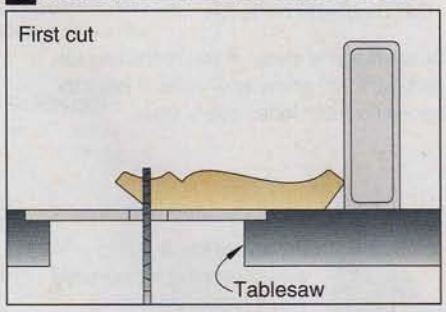
For the two-piece crown-molding bracket feet we're making here, cut from each blank a side piece as long as the depth of the cabinet (or ¼" longer to create a reveal, as shown *above*) and a short front piece. To make the wood grain flow around mitered corners like the one *above*, first measure the combined length of the front and side pieces for each foot and add 2". Then cut two blanks that long.

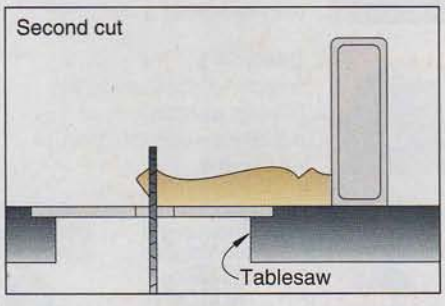
Next, tilt your tablesaw blade to 45° and test for accuracy using scrap. With an extension on your miter gauge, cut the front piece to length. To cut the side piece, turn the remainder of the blank end for end, and miter as close as



A Cutting at the black and red lines yields the widest blank after removing the bevels. Cuts at the green lines leave a thicker top edge.

1 REMOVE BEVELS IN TWO PASSES





possible to the previously mitered end so you leave a triangular piece of waste **[Photo B]**. Repeat for the other side and front pieces. Then reset the blade to 90° and cut the side pieces to length.

Cut curved patterns

You can create your own bracket foot cutout design, or use a pattern such as the one in the *WOOD Patterns® insert* on *page 48* for the bookcase. You also can fine-tune an existing pattern to fit the width of your molding blank **[Drawing 2]**. Because you'll need a mirror pattern for the other side of your project, use a photocopier "mirror image" setting to make a reversed pair of the original patterns. Otherwise, trim a pattern to the lines, turn it upside down, and use spray adhesive to attach it to the mitered blank.

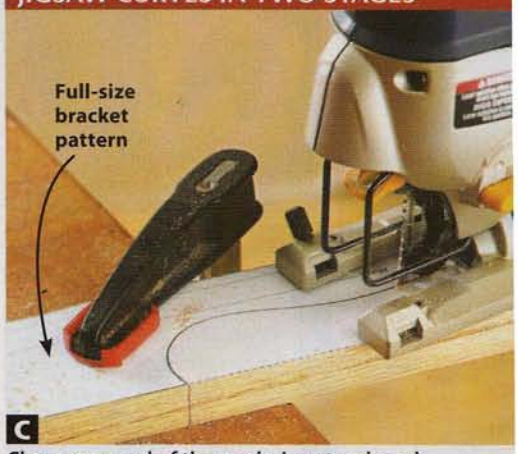
A scrollsaw with a #7 (12 tpi) blade will produce clean cuts that need minimal sanding. If you don't have a scrollsaw, use a jigsaw with a 12-tpi blade **[Photo C]**.

To assemble one of the brackets, glue and press the miters together by hand **[Photo D]**. Keep pressure on the pieces for 2 minutes; then carefully release them to avoid jarring the joint. Allow 3 hours for the glue to dry. This way, you avoid problems attaching clamps to the uneven routed profile while keeping the parts aligned.

BACK UP MITER CUTS

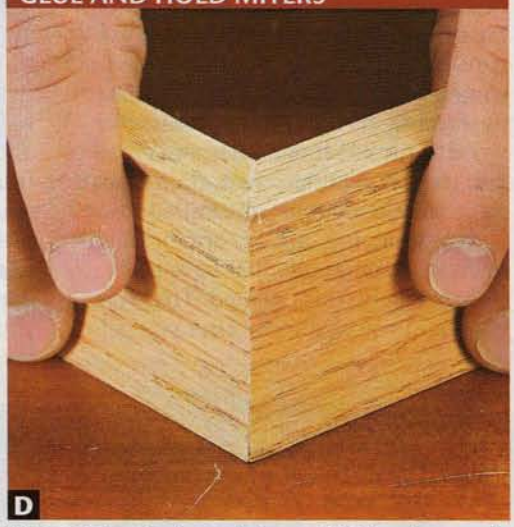
With two parallel edges created after removing the bevels, molding blanks can be turned end for end and mitered to leave just a tiny piece of scrap.

JIGSAW CURVES IN TWO STAGES



Clamp one end of the workpiece to a bench, and jigsaw half of the curved pattern. Then clamp the other end, and finish the profile.

GLUE AND HOLD MITERS



We used standard wood glue on this hand-pressed joint, but Titebond Wood Molding Glue (800-669-4593 or titebond.com) tacks and dries faster.

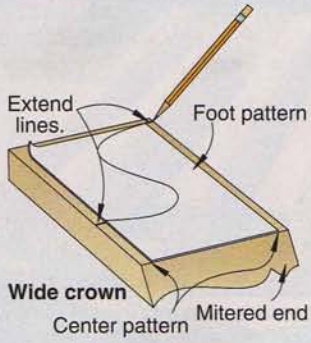
ADD A MOUNTING BLOCK

A ¾"-thick mounting block helps reinforce the crown-molding miter joint. Drill mounting screw holes to suit the case frame.

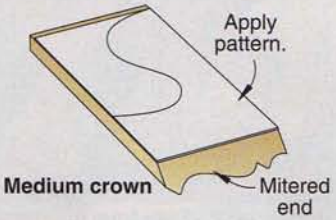
Add mounting blocks

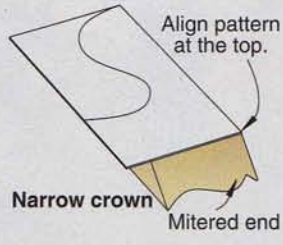
You could now simply glue and clamp the assembled bracket feet to your project. But to add strength and a place to sink mounting screws, attach a mounting block to the inside corner **[Photo E]**. From ¾" solid wood or plywood, cut a block smaller than the inside bracket dimensions. Then glue and clamp the block flush with the top edges of the foot. After the glue dries, drill shank holes, glue, and screw the assembly to your cabinet. For the bookcase, shown on *page 60*, we left ⅛" of the top edges of the brackets exposed as decorative touches.

Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

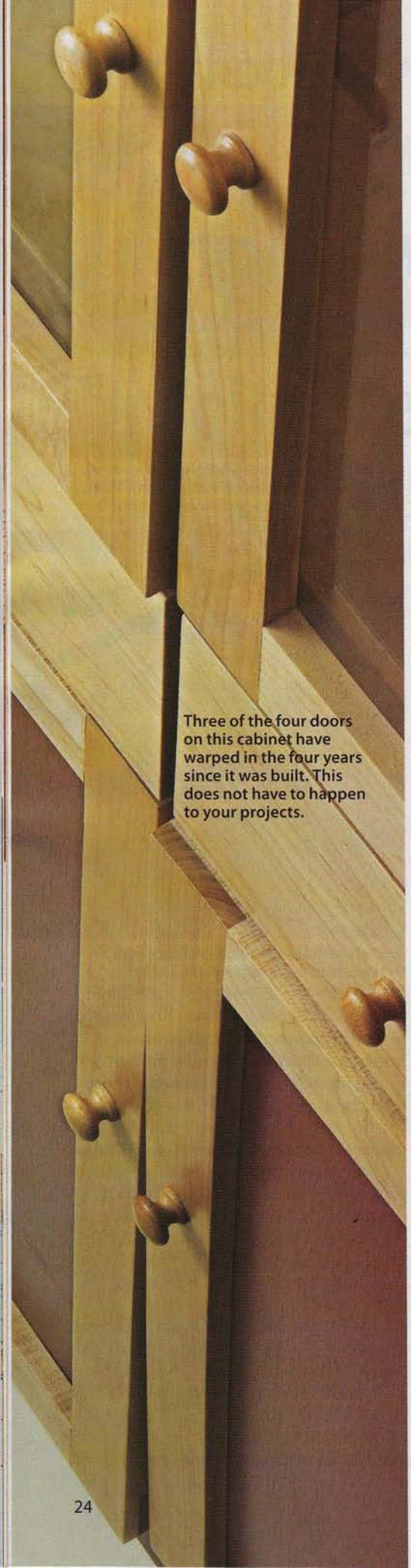


2 SIZE THE TEMPLATE TO THE BLANK





You can modify a single serpentine pattern to work on different crown-molding widths.



Three of the four doors on this cabinet have warped in the four years since it was built. This does not have to happen to your projects.

Avoiding Workshop Goofs

Ward off warped doors

Come on, baby, let's NOT do the twist!

Know one thing right up front: You'll never completely *prevent* doors from warping. But, you can greatly *reduce* the chances of that happening. Here's how.

Grain is for more than a great look

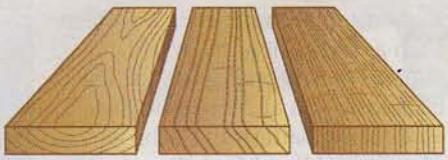
No matter what size doors you make, the grain on a workpiece should be your top priority when choosing stock. Insist on quartersawn or riftsawn wood for stiles and rails, because its grain runs straight along the length, as shown at *right*, making it more resistant to warping. By comparison, flatsawn wood, with its semicircular end grain and cathedral-pattern face grain, warps more frequently and substantially.

When buying lumber, opt for rough-sawn stock or boards that have been only partially (skip) planed. That way, if a board warps slightly after you get it home, you'll be able to flatten it and still get a board that's ¾" thick.

Allow these boards to acclimate to your shop's temperature and humidity for at least two days before making the first cut. Then, cut your workpieces at least ¼" oversize in length and width, and plane them to within ⅛" of the final thickness. If any board pinches on your tablesaw blade or splitter, you're seeing a telltale red flag of a board releasing tension. Don't use it for your door; it will only warp later and cause you grief. Let the good boards acclimate for another day, as shown *below*.

Finally, flatten one face and edge on your workpiece, plane it to thickness, rip it to final width, and crosscut it to final length. Make your door frames from these pieces. If any show signs of warping, as shown on page *25*, discard them and make a new piece.

GRAIN PATTERN PROVES CRITICAL



Flatsawn Riftsawn Quartersawn

TIME REVEALS A WELL-MADE DOOR

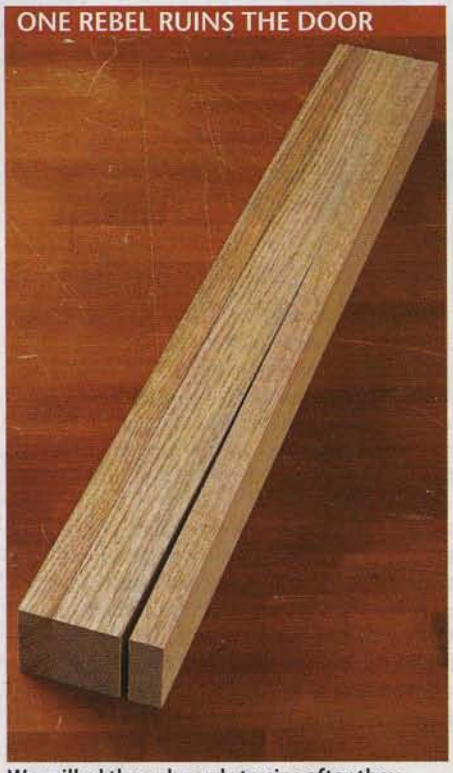
This dresser door, made from quartersawn white oak, looks as square and true as the day it came out of our shop 4½ years ago.

Fill the frame with a warp-proof panel

Now that you've got your stiles and rails ready, prepare the panel to best ward off warping. If possible, choose veneered medium-density fiberboard

WOOD HAS TO BREATHE, TOO

Arrange your boards on strips of scrapwood so the faces and edges get maximum exposure to your shop's air.



We milled these boards to size after they acclimated to our shop, but the one on the right bowed and was sent to the scrap bin.

(MDF) for the panel—it exhibits little seasonal movement and will remain flat. Veneered plywood panels will shrink and swell slightly, but still prove a good option, particularly those with thinner plies.

For solid-wood panels, choose boards with similar grain so they'll shrink and swell equally. It's okay to use flatsawn boards here, but rip them no greater than 4" wide and then glue up your panel, as shown at *right*. After the glue dries, flatten the panel by sanding or planing. Before installing it, though, let it sit in your shop for a day to be sure it stays flat. If it warps after glue-up, cut your losses and make a new panel.

Apply these helpful tips to combat warping

- When selecting stock for stiles and rails, put the straightest grain on the longest door parts. The long components of a door tend to warp first.
- After machining your rails and stiles to final size, select the stile with the straightest, tightest grain for the handle side of the door. Without hinges to hold it straight, this piece will more likely warp than its counterpart.
- Avoid boards with figured grain or knots when making stiles and rails. Although often attractive, these features increase chances of warping.
- Machine grooves in the stiles and rails to hold the panel snugly, so you can just slide it in and out. Loose grooves increase the tendency for the panel to twist.
- Use two magnetic catches or barrel clasps (one at the top and bottom) instead of one to hold a door shut. A door with only one catch could warp in the free corner.

We glued up this 12"-wide panel from three flatsawn boards that proved flat, allowing us to focus on the best face-grain match.

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Circle No. 733

Wise Buys

Our Editors Test

Aftermarket Bandsaw Fences

Why buy?

If you use your bandsaw only for making curved cuts, you'll likely never need a rip fence. For accurate ripping and resawing, though, a good fence helps greatly. That said, many bandsaws don't come with a fence—including three of the eight we tested on *pages 54-59*. Those saws that do have fences, particularly on lower-cost models, often don't work that well. The three fences we recommend here fit virtually any 14" bandsaw and some 12" models. (Before buying, check with the fence manufacturer to see if its product works with your bandsaw.)

ROCKLER, #24504, $150

Editor test-drive:

For the price of competitors' aftermarket fences, the Rockler 24504 provides an auxiliary table with perpendicular miter slots, a 3"-tall fence, and replaceable throat inserts. The 1⅛"-thick, 24"-square MDF table easily clamped onto my bandsaw's table and offers nearly twice as much surface area as typical factory tables. Removing blade drift proved easy and intuitive; I only had to adjust the two bolts that thread into the T-square end bracket (that mounts to the rails).

After that adjustment, I could resaw ⅛"-thick pieces of red oak with almost no deviation in thickness. A T-slot milled into the MDF fence face accepts feather boards, hold-downs, or stopblocks, but overtightening can crush the thin walls. (I'd prefer aluminum T-track in the fence.) With only one working face, this fence must be used left of the blade—a drawback when tilting the table because I like my workpiece to ride against the fence in that situation. Rockler includes a jig for cutting circles up to 26" in diameter.

—Tested by Craig Ruegsegger, Multimedia Editor

To learn more: rockler.com; 800-279-4441

KREG, #KMS7200, $120

Editor test-drive:

My bandsaw's factory fence is always on the saw. Not because I love it, but because I have to remove the blade before I can slide the fence off the right end of the rail! And that's one of the main reasons I replaced it with the Kreg KMS7200, which lifts on and off anywhere along its rail. The lock holds the 2⅜"-tall fence securely when resawing, even with long workpieces that apply greater force against the fence. Fine-adjustment screws on the fence make it easy to counter blade drift. The fence sports T-slots on both faces as well as the top and bottom of the fence. So I can lay it sideways to reach under the blade guides for short, thin rips.

The micro-adjuster accessory (#KMS7215, $15) proved dead-on and well worth the price. It mounts to the left side of the fence and helps precisely dial in a rip cut. I used the micro-adjuster to find the exact center of a ¾"-thick piece of red oak and resawed it at that point. The resulting cut showed almost no difference in thickness from end to end when checked with a caliper.

—Tested by Bob Wilson, Techniques Editor

To learn more: kregtool.com; 800-447-8638

WOODHAVEN, #7280, $140

Editor test-drive:

I want my bandsaw fence to be intuitive to use, easy to take off and put back on, and have T-slots for mounting jigs and accessories. Woodhaven's fence does all that and more. It starts with two 24"-long aluminum rails that mount to the holes in my saw's table, with no drilling needed. These rails slide left and right when not locked, giving me plenty of options for fence position. And, although the fence can't simply be lifted off the rails, it's only a five-second job to slide the rails to the right and then the fence to the left. No blade removal required.

The fence itself is 24" long and 3" tall with eight T-slots, and holds solidly without deflecting. It's easy to adjust square to the table and to correct blade drift. I like the included handy stop that mounts in the T-slots and prevents cutting into tenon shoulders. Finally, Woodhaven sells this fence with an optional circle-cutting attachment (#7285K, $183) that mounts onto the ends of the fence rails, enabling you to cut circles up to 26" in diameter.

—Tested by Kevin Boyle, Senior Design Editor

To learn more: woodhaven.com; 800-344-6657

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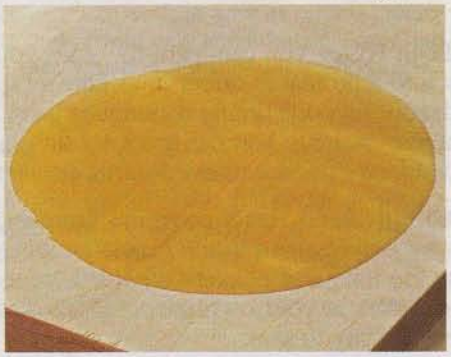
Whether you're new to finishing or just want a fuss-free way to protect a project, a wipe-on mix of oil and varnish brings out wood's natural glow while building a shield against humidity and wear. And you can repair most minor damage in minutes with a light sanding and touch-up coat of this finish.

Although commercial oil-varnish mixes are available, you can save money by mixing ingredients in your shop. To create the finish we applied to the cabinet shown on *page 30* and *above*, we mixed three parts gloss polyurethane varnish to two parts each of boiled linseed oil and naphtha, which evaporates faster than mineral spirits. The oil penetrates the wood, deepening the grain of such species as walnut and adding grain contrast in curly maple, as shown *top*. The varnish leaves a thin film finish, while the naphtha makes the mixture easy to spread with a soft cloth. Together, the oil and varnish give light woods, such as maple, a warm amber color, as shown *above*.

Increasing the percentage of varnish builds protection faster without sacrificing grain-enhancing benefits from the boiled linseed oil (BLO). The mix on the *left* produced the same color and depth as the one on the *right*, but added 50 percent more varnish with each coat.

By penetrating deeper into porous areas of curly maple, an oil/varnish finish brings out the beauty of the grain figure.



Both the oil and varnish in this finish add amber color you can see on this pale maple. Also, both ingredients will darken with age.

Many oil-and-varnish recipes call for equal amounts of boiled linseed oil, varnish, and mineral spirits. But as the sample *below left* shows, you can get the same results and build a film finish quicker by increasing the percentage of varnish until you notice wiping marks.

Apply a flawless finish

To prepare the wood, sand up to 180 grit. Then vacuum off or blow dust from the pores with compressed air before you wipe down the surface with a soft cloth.

Wipe on the finish with a clean cloth until you saturate the wood surface. Then remove all excess finish with a clean cloth, especially in recesses and corners where it may pool. Excess finish will turn soft, gummy, and tricky to remove. After an hour, check for signs of oil bleeding out of the pores, and wipe it away before it cures. Allow one full day for the finish to cure.

Then lightly sand the finish with a 320-grit sanding sponge. Clean the surface and apply a second coat, again wiping away the surplus. Wipe on as many coats as you want—with 24 hours and a light scuff-sanding between each—but four is sufficient.

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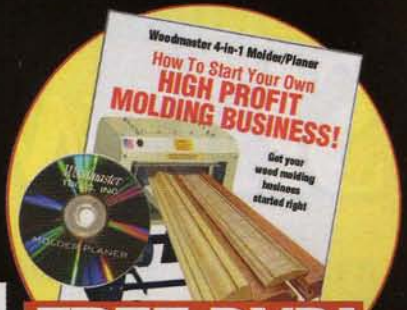

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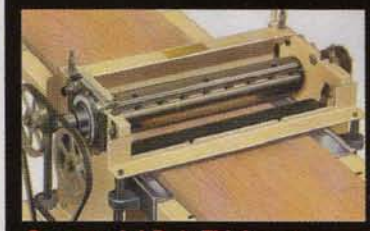

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Circle No. 1820

Build it your way

Showplace Cabinet

It's your call which version of this handsome cabinet to build: One showcases collectibles such as glassware, the other displays your hunting rifles and shotguns.

Trigger and cable locks have been removed for photography. Always store your firearms in a way that's safe for your circumstances.

PROJECT HIGHLIGHTS

- Overall dimensions: 33¼" wide x 16⅜" deep x 74" high.
- Display up to six rifles or shotguns, or build the version with glass shelves and a mirror back to display collections.
- Two pull-out trays under the display compartment provide hidden storage.
- Outfit your cabinet with low-voltage lights and a three-position dimmer.
- For the self-closing hinges, knob, cam lock, full-extension drawer slides, and low-voltage lighting kit see **Source** on *page 38*.

Skill Builders

- Learn about stub-tenon-and-groove joinery that speeds construction and produces sturdy furniture.
- Discover how a simple plywood guide makes positioning biscuit slots a snap.

See a Slide Show of this project coming together at: woodmagazine.com/slides

Standing a little more than 6 feet tall, this grand walnut cabinet lends distinction to any room. As a gun cabinet, it's perfect for a den or recreation room. The display cabinet, with its glass shelves and mirrored back, will add sparkle to the living room or dining room. Either way, it's a beautiful piece of furniture you'll be proud to say you built.

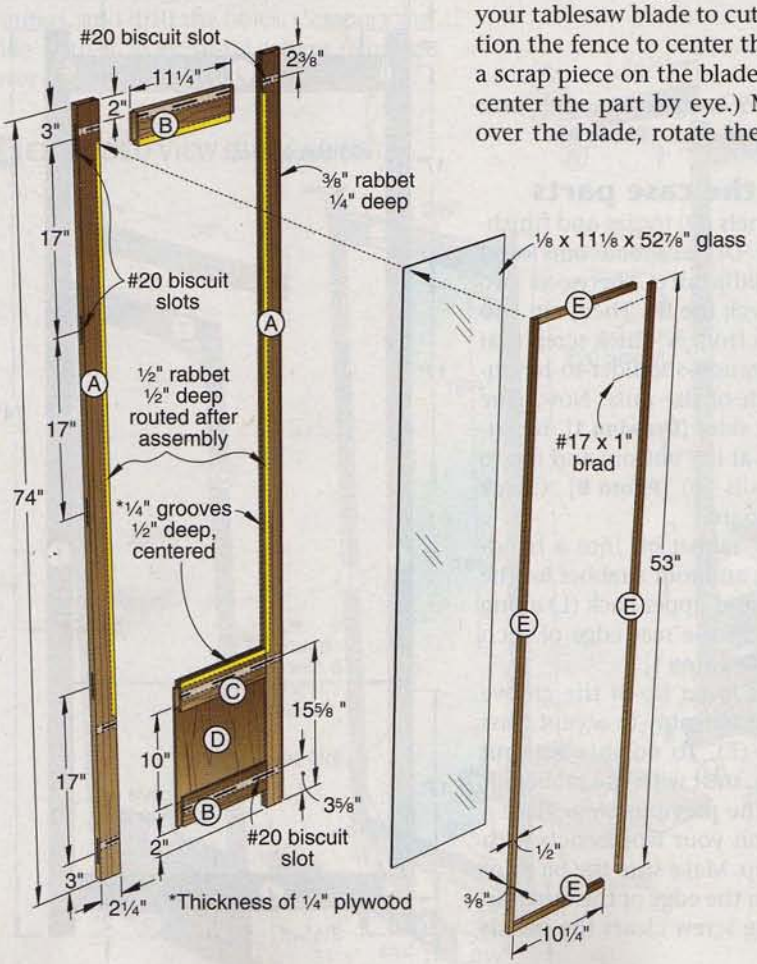
Form grooves and tenons

Note: *Most stub-tenon-and-groove joints have ⅜"-long tenons and ⅜"-deep grooves. Because the side frames and door in this project hold large glass panels, we increased the tenon length and groove depth to ½" for extra strength. For efficiency, the top, shelf, and bottom are constructed in the same manner. To ensure accuracy and eliminate repeat setups, machine all the parts that utilize stub-tenon-and-groove joinery at the same time.*

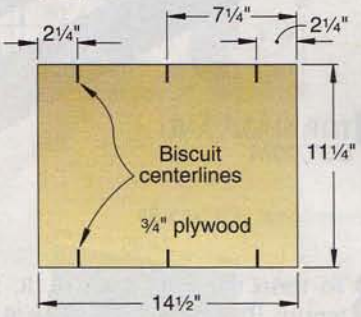
1 Cut the side stiles (A), rails (B), and middle rails (C); bottom, shelf, and top stiles (F) and rails (G); and door stiles (Q), bottom rail (R), middle rail (S), and top rail (T) to size [**Materials List**, *page 38*]. Mark the part letter on each part with chalk. Also, for cutting the grooves, mark the inside edges of parts A, B, F, G, Q, R, and T, and both edges of parts C and S [**Drawings 1**, **1b**, **2**, **2a**, **6**, and **6a**]. Reserve some scrap pieces of the same thickness to test your machine setups.

2 Cut centered grooves to match the thickness of ¼" plywood in the marked part edges. To do this, adjust your tablesaw blade to cut ½" deep. Position the fence to center the thickness of a scrap piece on the blade. (You can just center the part by eye.) Make one pass over the blade, rotate the piece end for end, and make another pass. Then, moving the fence closer to the blade in small increments, cut, rotate, cut, move the fence, and repeat until the ¼" plywood fits snugly in the groove. Now, cut the grooves in all the parts. Raise the blade to 2", and make two additional passes over the blade with the door top rail (T). For uniform-width grooves, especially in the long parts, use a feather board to keep the parts tightly against the fence.

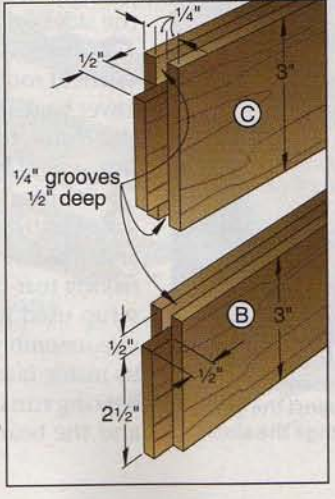
1 SIDE FOR GUN CABINET (Left inside face shown)



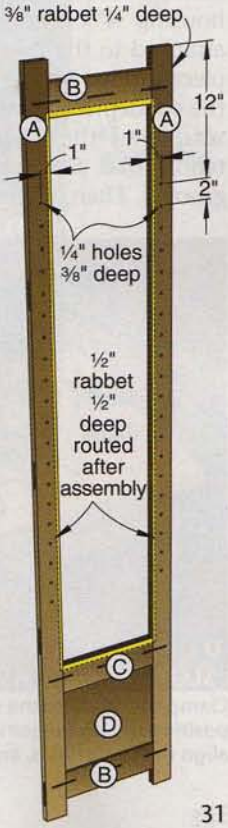
1a BISCUIT GUIDE

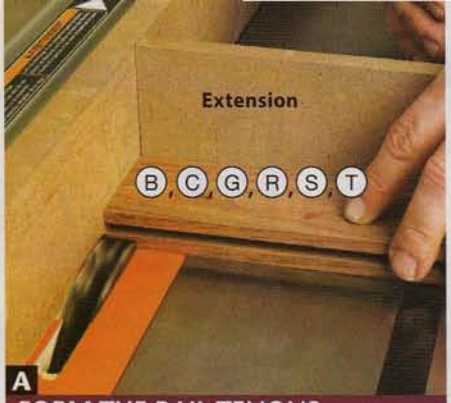


1b SIDE TENON DETAILS (Viewed from back)



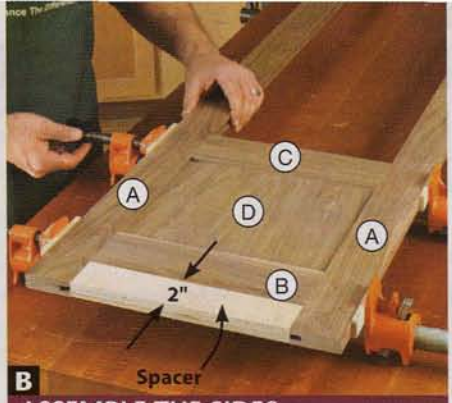
1c SIDE FOR DISPLAY CABINET (Left inside face shown)





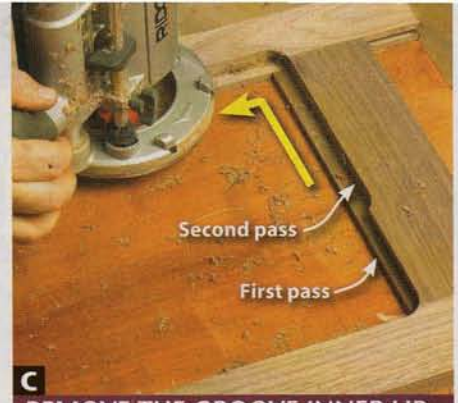
A FORM THE RAIL TENONS

With a partially housed ⅝" dado blade, the fence as a stop, and a miter-gauge extension as a backer, cut the rail (B, C, G, R, S, T) tenons.



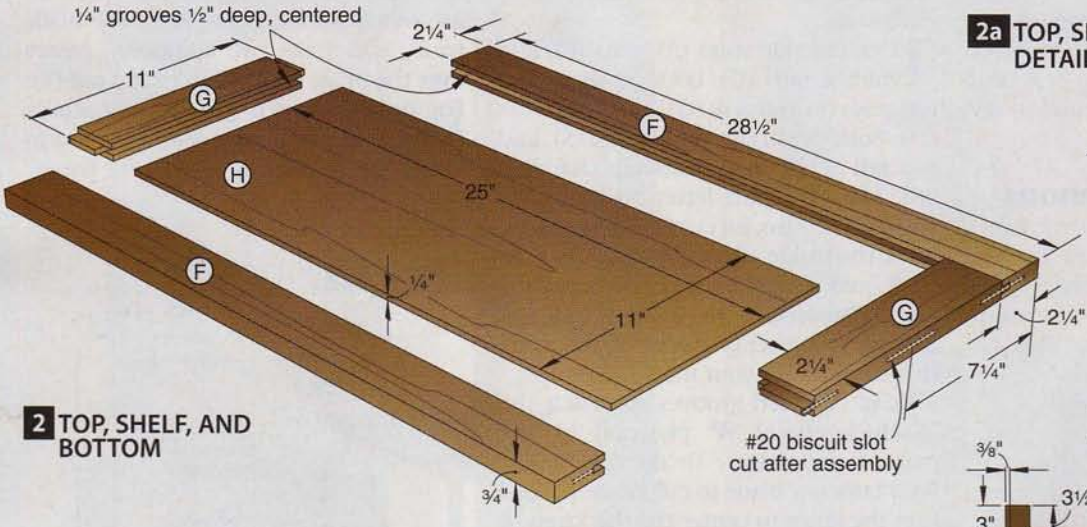
B ASSEMBLE THE SIDES

Using 2"-wide spacers to position the rails (B) at the top and bottom (bottom shown), glue and clamp the sides (A/B/C/D).



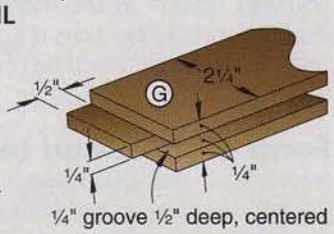
C REMOVE THE GROOVE INNER LIP

After making one pass over the inner lip with a ¼" rabbet bit, switch to a ½" rabbet bit and climb-cut to remove the remaining portion.

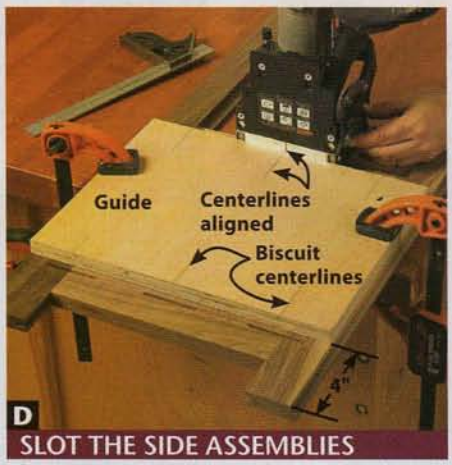


2 TOP, SHELF, AND BOTTOM

2a TOP, SHELF, AND BOTTOM TENON DETAIL



3 To form the rail (B, C, G, R, S, T) tenons [**Drawings 1**, **1b**, **2**, **2a**, **6**, **6a**], install a ⅝" dado blade in your tablesaw, housing ¼" of it in an auxiliary fence attached to the rip fence. Using a scrap piece guided by the miter gauge, adjust the cut depth so passing each face of the scrap over the blade yields a centered tenon that fits snugly into the stile grooves. Then, adjust the fence as a stop to produce a ½"-long tenon and form tenons on the rail ends [**Photo A**].



D SLOT THE SIDE ASSEMBLIES

Clamp the guide to the side assembly, position the biscuit joiner against the guide, align the centerlines, and plunge the slots.

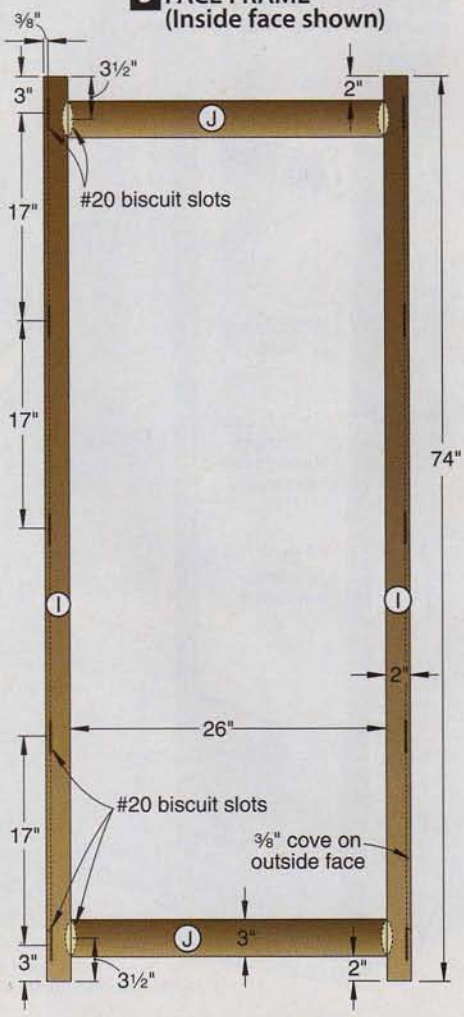
Assemble the case parts

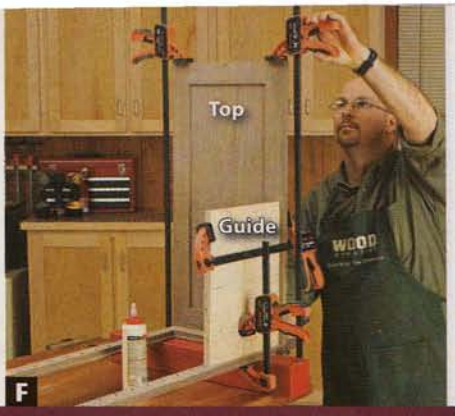
1 Cut the panels (D) to size and finish-sand them. Dry-assemble one lower rail (B) and middle rail (C) between two stiles (A) to check the fit. Then, cut two 2"-wide spacers from ¾"-thick scrap that match the tenon-shoulder-to-tenon-shoulder length of the rails. Now, glue and clamp the sides [**Drawing 1**], inserting the spacers at the bottom and top to position the rails (B) [**Photo B**]. Check the sides for square.

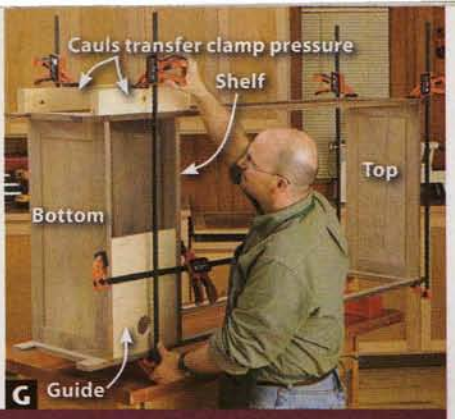
2 Chuck a ¼" rabbet bit into a hand-held router, and rout a rabbet for the lower back (K) and upper back (L) along the inside face at the rear edge of each side assembly [**Drawing 1**].

3 Remove the inner lip of the groove in each side assembly to accept glass and glass stop (E). To do this without risking tear-out, start with the rabbet-bit setup used in the previous step. Place a side assembly on your workbench with its inside face up. Make sure the bit pilot bearing runs on the edge of the outer lip and the bearing screw clears the bench

3 FACE FRAME (Inside face shown)







ASSEMBLE THE CASE

Using the guide as a spacer and a squaring brace, glue, biscuit, and clamp the bottom and shelf assemblies to one side assembly.

Transfer the guide to the top end of the side assembly, and glue, biscuit, and clamp the top assembly in place.

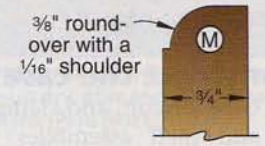
With the guide clamped between the bottom and shelf to keep everything square, glue, biscuit, and clamp the second side assembly.

surface, and the cutter will remove the entire thickness of the inner lip. If necessary for bearing-screw clearance, place scrap blocks under the side assembly. Clamp the assembly to the workbench, firmly grip the router, and climb-cut, removing ¼" of the ½"-deep lip. Switch to a ½" rabbet bit (or switch pilot bearings of a rabbet set with interchangeable bearings), and complete the job [**Photo C**]. Square the corners with a chisel.

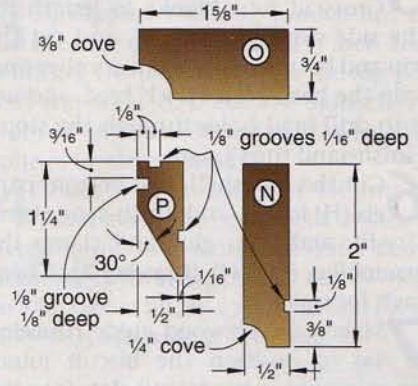
4 If you are building the display cabinet, lay out shelf-support hole centers [**Drawing 1c**]. Chuck a ¼" brad-point bit into your drill press, position the fence to align the bit with the hole centers, and drill the holes. (Support the side with a work stand where it hangs over the table edge.)

Designer Jeff Mertz shows the features of the cabinet in a FREE video at: woodmagazine.com/videos

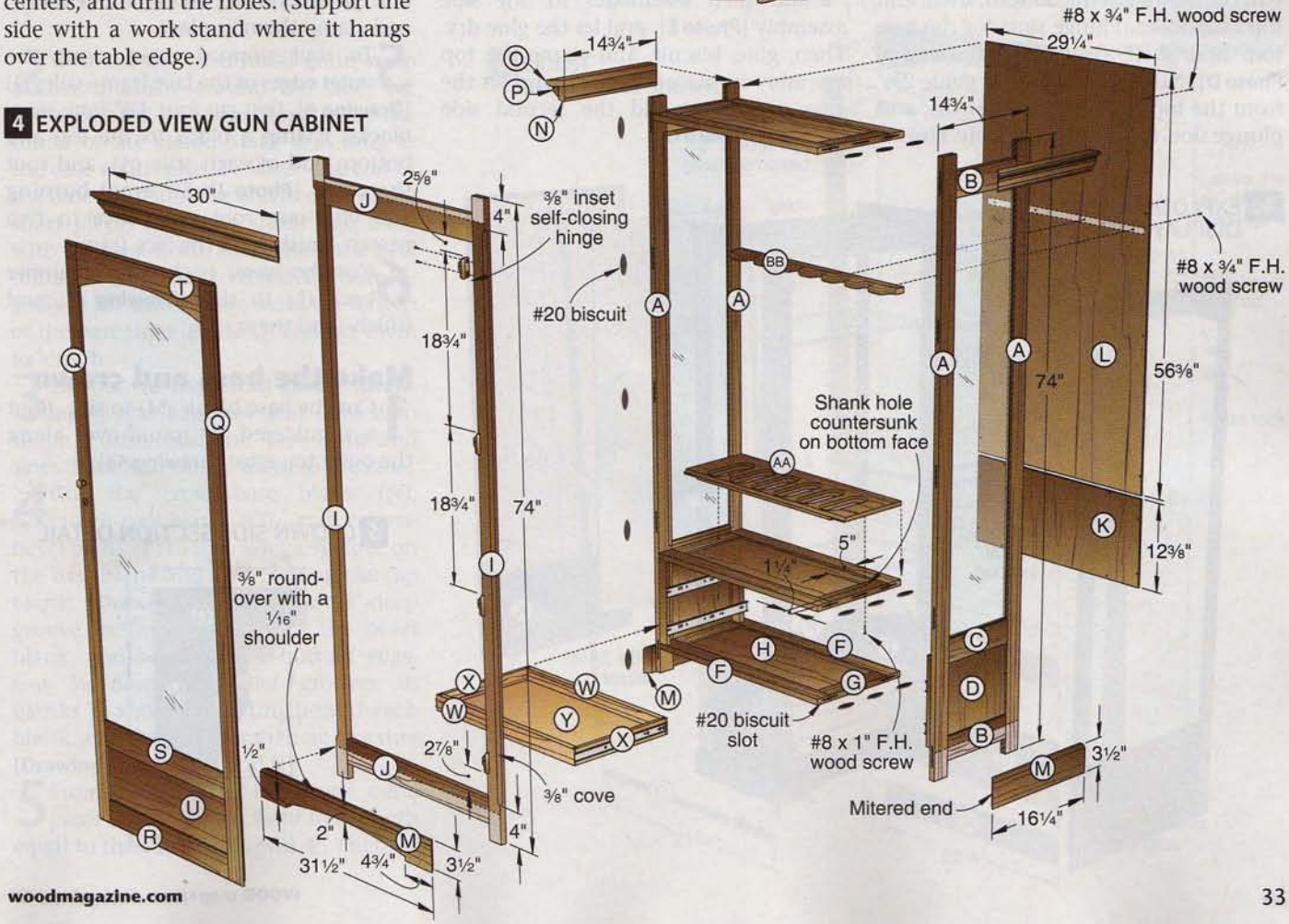
4a BASE SECTION VIEW

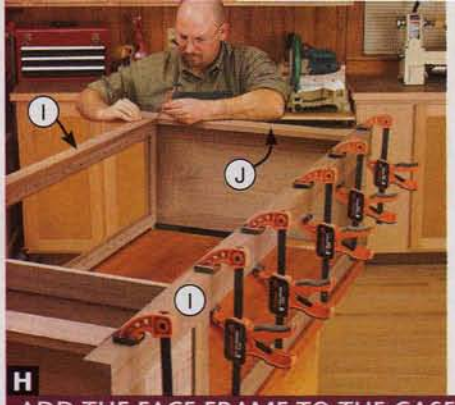


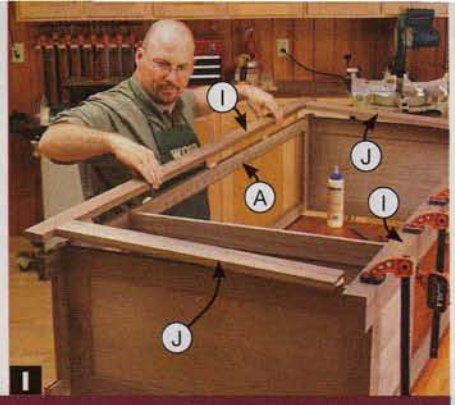
4b CROWN SIDE SECTION DETAIL



4 EXPLODED VIEW GUN CABINET



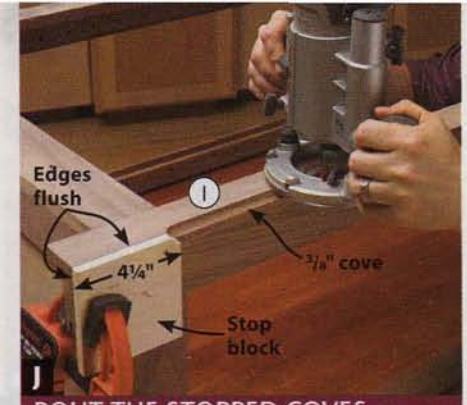




ADD THE FACE FRAME TO THE CASE

Clamp one stile (I) in place, position the overlength rail (J) against it, hold the second stile (I) in place, and mark the length of the rail.

Glue and biscuit the rails (J) to the second stile (I). Then glue and biscuit these parts to the first stile (I) and the side stile (A).



ROUT THE STOPPED COVES

Starting and ending with the ⅜" cove bit pilot bearing against a stopblock, rout stopped coves along the edge of each stile (I).

5 Cut the glass stop blanks (E) to size. Crosscut four blanks to length for the side stops [**Drawing 1**], and cut the top and bottom stops from another one. Clip the head off a #17×1" brad, and use it to drill brad holes through the stops. Finish-sand the stops.

6 Cut the top, shelf, and bottom panels (H) to size, and finish-sand them. Dry-fit, and then glue and clamp the assemblies (F/G/H) [**Drawing 2**]. Check each for square.

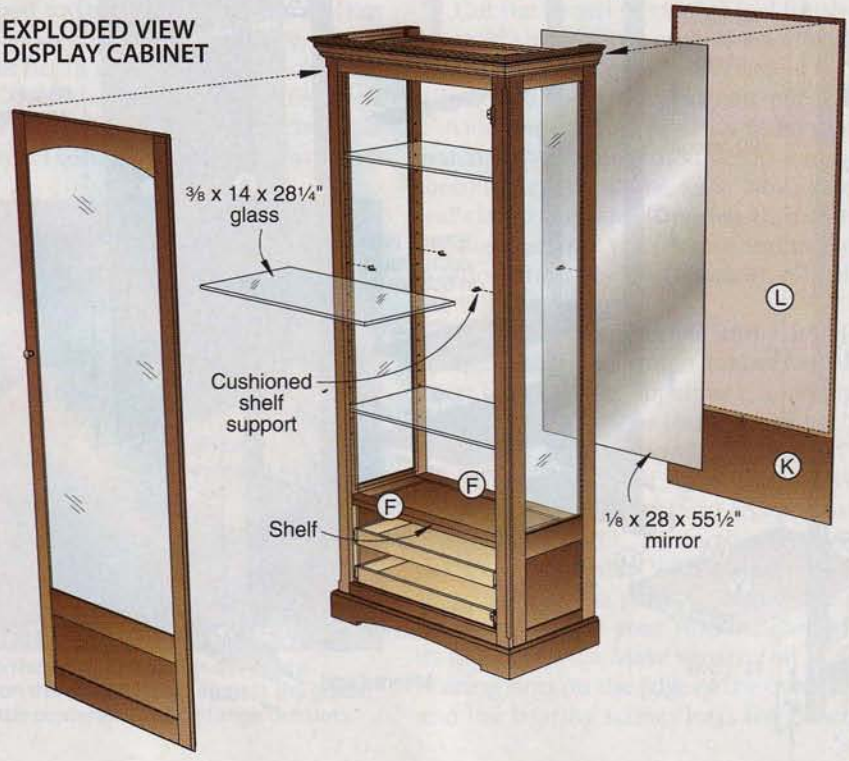
7 Make a ¾" plywood guide [**Drawing 1a**] to position the biscuit joiner when plunging the biscuit slots into the side assemblies and to transfer the biscuit centerlines to the bottom, shelf, and top assemblies. Plunge slots for the bottom and shelf assemblies [**Drawing 1**, **Photo D**]. Now, reposition the guide 2¾" from the top ends of the stiles (A), and plunge slots for the top assembly. Finish-sand the side assemblies. To ensure a tight fit between the front stiles (A) and face frame stiles (I), do not sand the front stile edges.

8 Transfer the biscuit centerlines on the guide to the bottom, shelf, and top assemblies. Adjust the biscuit-joiner fence to center a slot on the ¾" thickness of the stiles (F) and rails (G), and plunge the slots [**Drawing 2**]. Finish-sand the stile and rail faces. To ensure tight joints where these parts mate with others, do not sand the edges.

Construct the case

1 Glue, biscuit, and clamp the bottom and shelf assemblies to one side assembly [**Photo E**], and let the glue dry. Then, glue, biscuit, and clamp the top assembly in place [**Photo F**], and let the glue dry. Now, add the second side assembly [**Photo G**].

4c EXPLODED VIEW DISPLAY CABINET



2 Cut the face frame stiles (I) to size, and the rails (J) 1" longer than listed. Dry-assemble and mark the finished length of the rails [**Photo H**], and cut them to length.

3 Plunge biscuit slots into the front edges of the side-assembly front stiles (A) [**Drawing 1**], and mating slots into the rear faces of the face-frame stiles (I) [**Drawing 3**]. Then, plunge biscuit slots into the inside edges of the face-frame stiles and mating slots into the ends of the face-frame rails (J).

4 Glue, biscuit, and clamp one face-frame stile (I) to the front stile (A) of one side assembly. Then, add the rails (J) and the second face-frame stile [**Photo I**], and clamp them in place.

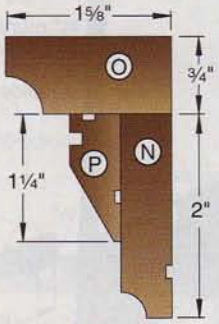
5 To rout stopped coves along the outer edges of the face frame stiles (I) [**Drawing 4**], first cut four 4¼"-long stopblocks. Clamp a block to the top and bottom end of each stile (A), and rout the coves [**Photo J**]. To avoid burning and chip-out, rout each cove in two passes. Finish-sand the face frame.

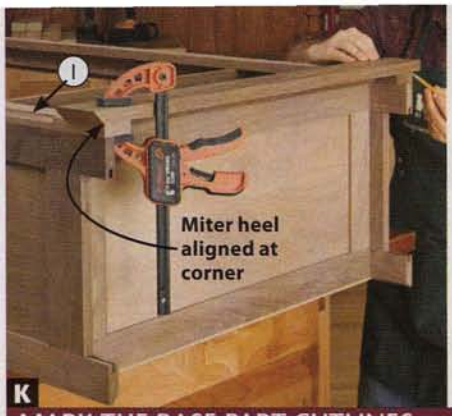
6 Cut the lower back (K) and upper back (L) to size [**Drawing 4**], and finish-sand them.

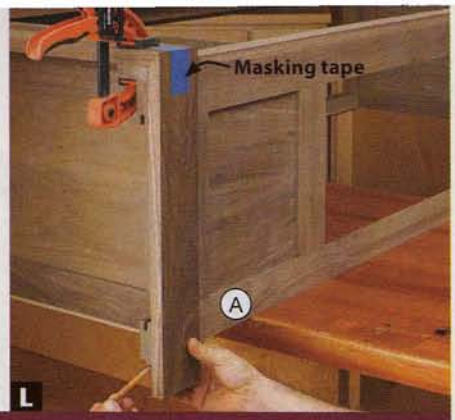
Make the base and crown

1 Cut the base blank (M) to size. Rout a shouldered ⅜" round-over along the outer top edge [**Drawing 4a**].

5 CROWN SIDE SECTION DETAIL







MARK THE BASE PART CUTLINES

Align the heel of the mitered end of the base front with the face-frame stile (I) corner. Mark the miter heel at the other end.

Clamp the base front in place, position a base side, and tape the miter together. Mark the side length flush with the rear stile (A).

GLUE UP THE CROWN

Working on a flat surface, glue and clamp the crown base blank (N) to the crown cap blank (O), keeping the ends and rear edges flush.

With the crown base blank (N) and crown cap blank (O) glue-up dry, glue and clamp the crown bevel blank (P) in place.

2 To make the base wood grain wrap continuously around the case, cut the piece for the base front from the center of the blank. Make it as long as the case width plus 2". Miter one end of the base front and the end of each of the short pieces (the base sides) that mate with the base-front. Next, mark the heel of the second base front miter [**Photo K**], and cut the miter. Now, mark the length of the base sides [**Photo L**], and cut them to length.

3 Lay out the base-front cutout [**Drawing 4**] and bandsaw and sand it to shape. Finish-sand the base front and sides. Glue and clamp them to the case.

4 Cut the crown-base blank (N), crown-cap blank (O), and crown-bevel blank (P) to size. Rout a ¼" cove on the base blank and a ⅜" cove on the cap blank [**Drawing 4b**]. Cut a ⅛"-deep groove in the front face of the bevel blank, and bevel-rip the bottom edge. Cut 1/16"-deep glue-relief grooves in blanks N and P. Now, finish-sand each blank, and glue and clamp them together [**Drawing 5**, **Photos M** and **N**].

5 From the center of the blank, cut a piece for the crown front to a length equal to the case width plus 4". Then, as with the base parts, miter, mark, and cut the parts to length. Glue and clamp the crown to the case [**Drawing 4**].

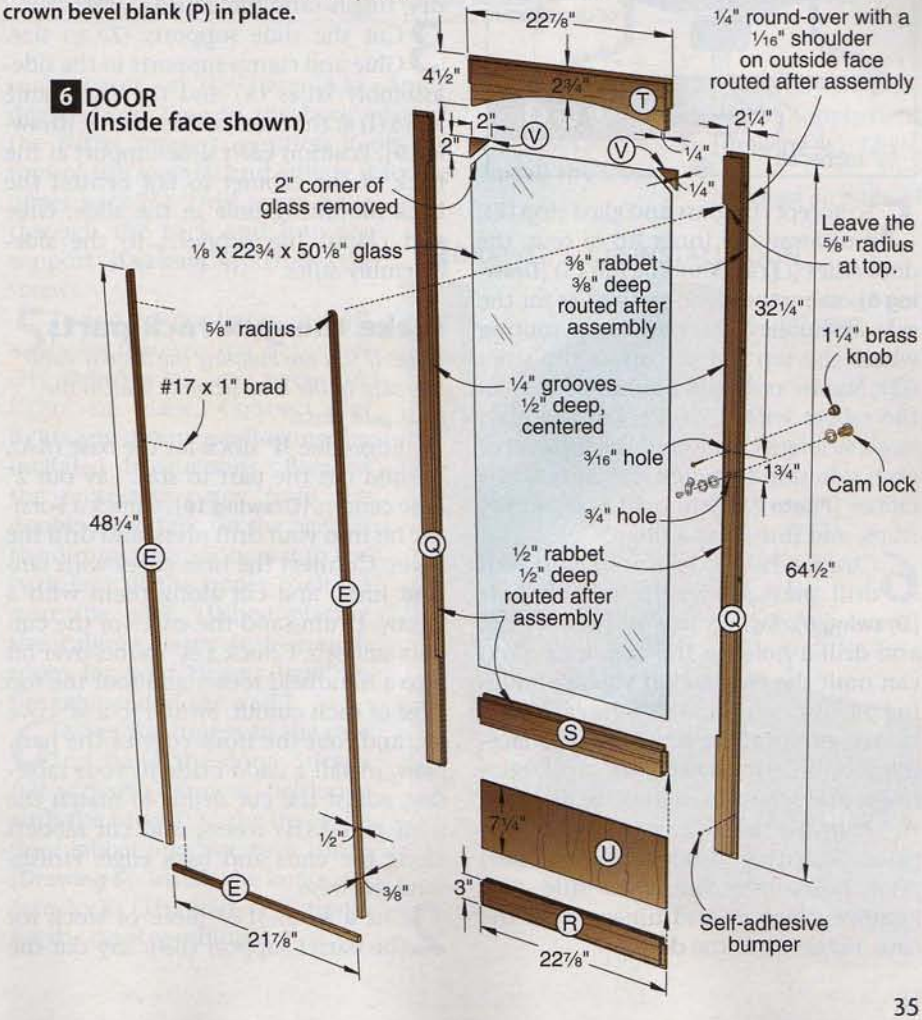
Assemble the door

1 Retrieve the door parts Q, R, S, and T. Using a fairing stick, draw the top-rail (T) arch. (For a free fairing stick plan, go to woodmagazine.com/fairing.) Bandsaw and sand the arch.

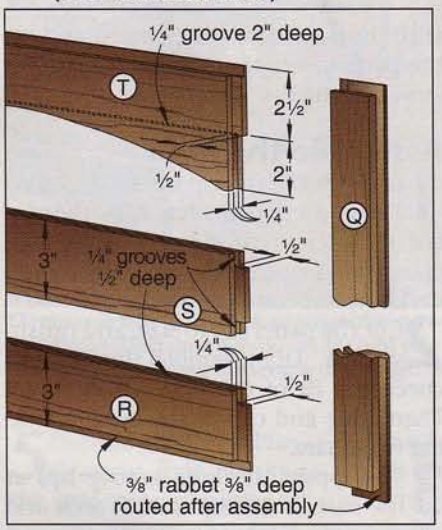
2 Cut the panel (U) to size, and finish-sand it. Dry-assemble the door to check the fit of the parts [**Drawing 6**]. Then, glue and clamp the door, checking for square.

3 To support the long groove lips at the base of the top-rail (T) arch and reinforce the joints between the top rail and the stiles (Q), cut the splines (V) from ¼" plywood [**Drawing 6**]. Glue the splines in place [**Photo O**].

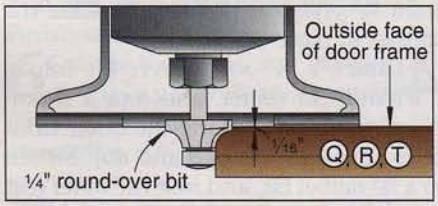
4 Chuck a ¼" round-over bit into a handheld router, and rout a shouldered round-over along the outer front door edges [**Drawings 6** and **6b**]. Switch to a ⅜" rabbet bit, and rout the outer rear door edges [**Drawings 6** and **6c**].



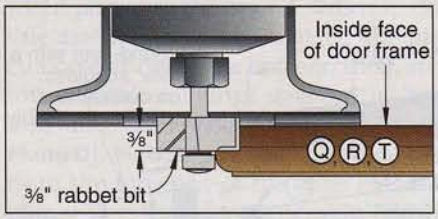
6a DOOR TENON DETAILS (Viewed from back)

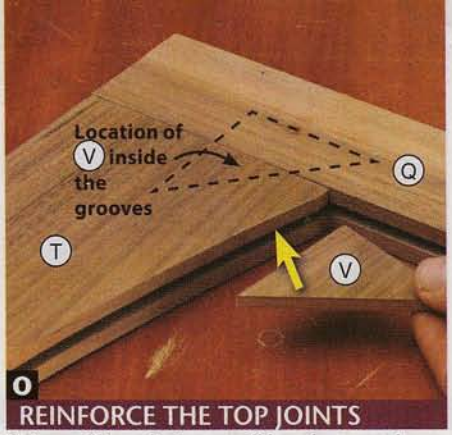


6b ROUTING THE DOOR

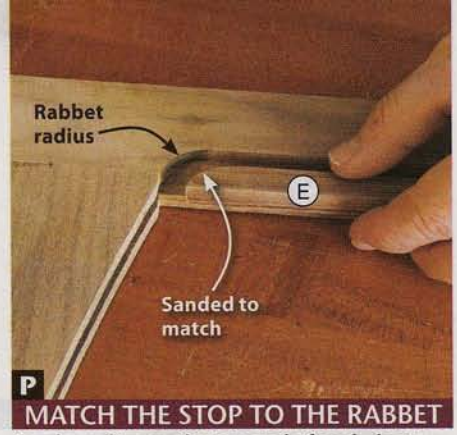


6c ROUTING THE DOOR





Using a thin splint or small brush, spread glue in the spline area in the stile (Q) and top-rail (T) grooves. Then, insert the spline (V).



Sand a radius on the top end of each door side stop (E) to match the radius at the top ends of the door rabbet.

5 To accept the glass and glass stop (E), rout away the inner lip of only the door stiles (Q) and middle rail (S) [**Drawing 6**], using the same method as for the side assemblies. Start and stop routing where the top rail (T) meets the stiles (Q). Square only the bottom corners of the rabbet with a chisel. Cut the glass stops to length, and sand the top end of each side stop to match the ends of the rabbet [**Photo P**]. Drill brad holes in the stops, and finish-sand them.

6 Chuck a 3⁄16" brad-point bit into your drill press, and drill a knob hole [**Drawing 6**]. Switch to a ¾" Forstner bit, and drill a hole for the cam lock. (You can omit the cam lock if you are building the display case.) With the case lying faceup, position the hinges on the face-frame stile (I) [**Drawing 4**], drill pilot holes, and screw them in place. Position the door on the case, and clamp it in place. Reaching inside the case, drill pilot holes into the door stile (Q). Remove the door and hinges from the case. Finish-sand the door.

Build two slide-out trays

1 From ¾" stock, cut the fronts and backs (W) to size and from ½" stock, cut the sides (X) to size. (We used poplar.) Then, to form the joints [**Drawings 7** and **7a**], follow the three steps of **Drawing 8**. Cut grooves for the bottoms (Y).

2 Cut the bottoms (Y) to size. Dry-assemble the trays to check the fit of the parts. Disassemble the trays, and finish-sand the bottoms and the inside faces of the fronts and backs (W) and sides (X). Glue and clamp the trays, checking them for square. With the glue dry, finish-sand the outside faces.

3 Cut the slide supports (Z) to size. Glue and clamp supports to the side-assembly stiles (A) and the face-frame stiles (I) at the front of the cabinet [**Drawing 9**]. Position each slide support at the back of the cabinet to fall behind the back mounting hole in the slide. Glue and clamp the supports to the side-assembly stiles.

Make the gun-rack parts

Note: *If you are building the display cabinet, skip to the next section, "Finish the case, add glass."*

1 Edge-glue ¾" stock for the base (AA), and cut the part to size. Lay out 2" hole centers [**Drawing 10**]. Chuck a Forstner bit into your drill press, and drill the holes. Connect the hole edges with tangent lines, and cut along them with a jigsaw. Drum-sand the edges of the cutouts smooth. Chuck a ¼" round-over bit into a handheld router and rout the top edge of each cutout. Switch to a ⅜" cove bit, and rout the front edge of the part. Now, install a dado blade in your tablesaw, adjust the cut depth to match the shelf panel (H) recess, and cut rabbets along the ends and back edge. Finish-sand the base.

2 Cut a ¾×3×31½" piece of stock for the barrel support (BB). Lay out the 1½" hole centers [**Drawing 10**], chuck a Forstner bit into your drill press, and drill the holes. Cut the part to finished length, trimming both ends. To convert the row of holes to notches, draw two ¾" radii tangent to each hole and the front edge of the part, and bandsaw and sand the notches to shape. Drum-sand the notches smooth, and then rout a ¼" round-over along the top and bottom edges. Finish-sand the barrel support.

Finish the case, add glass

1 Inspect all parts and assemblies, and finish-sand where needed. Apply a clear finish. (We made an oil/varnish blend, and applied three coats. To learn about this finish, see *page 28*.)

2 Have glass cut to size for the sides and door [**Drawings 1** and **6**]. If you are building the display cabinet, also have glass shelves and a mirror cut to size [**Drawing 4c**]. (We had the glass dealer finish our shelves with polished pencil edges and remove the sharp edges from the mirror.)

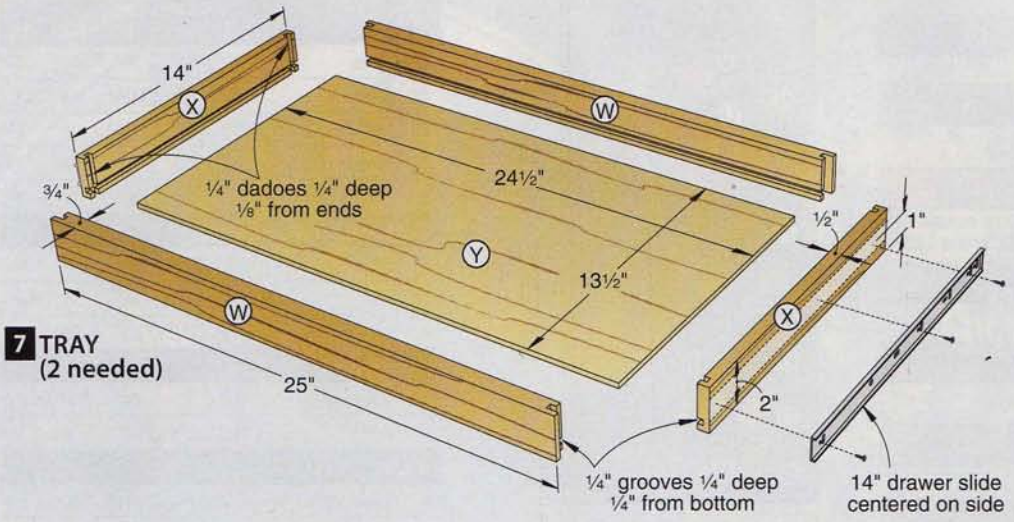
3 Lay the case on one side on a padded surface, position the glass, and nail the stops in place [**Photo Q**]. Turn the case onto the other side, and repeat.

4 Lay the door facedown on the pad. Position the glass in the rabbeted opening, sliding the end with the clipped corners into the top-rail (T) groove. Fasten the stops (E) with brads.

Assemble the cabinet

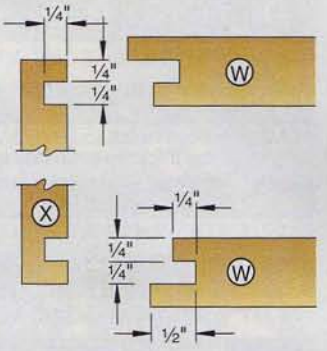
1 For the gun cabinet, clamp the base (AA) in place. From the bottom, drill screw holes through the shelf rails (G) into the base, and drive the screws [**Drawing 4**]. (For the #8 screws in this project, drill 5⁄32" shank holes and 7⁄64" pilot holes.)

2 Separate the parts of the drawer slides. Fasten the case members to the slide supports (Z) [**Drawing 9**], and

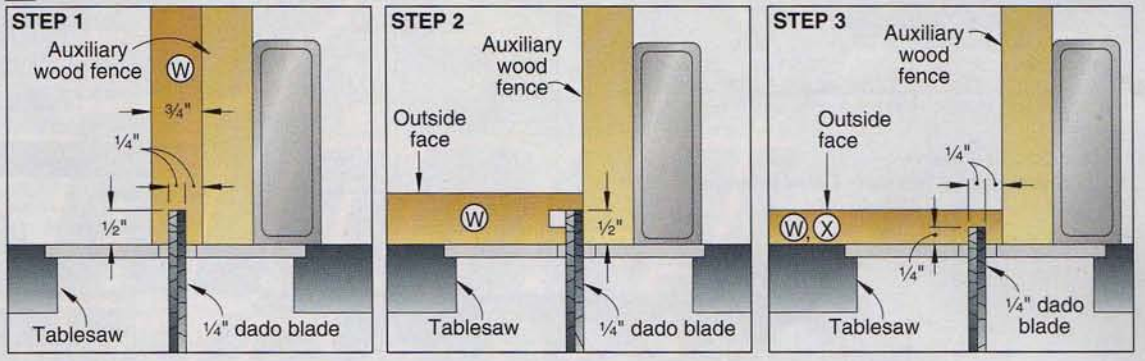


7 TRAY (2 needed)

7a TRAY-JOINT DETAIL



8 MACHINING THE TRAY PARTS



the drawer members to the trays [**Drawing 7**]. Slide the trays in.

3 Clamp the lower back (K) and upper back (L) to the case. Drill screw holes and, for the gun cabinet, drive the screws. For the display cabinet, drill the holes, then mark the top edge of the shelf rear stile (F) on the inside surface of the upper back. Screw the lower back in place. Remove the upper back and lay it on a flat surface with the inside surface up. Adhere the mirror to the upper back with mirror adhesive. Center the mirror side-to-side and align its bottom edge with the marked line. After the adhesive cures, screw the upper back to the case.

4 To install the gun-cabinet barrel support (BB), first cut a pair of 35¼"-long spacers. Then, place one end of each spacer on the base (AA). Apply double-faced tape to the back edge of the barrel support, position it on the tops of the spacers, and adhere it to the upper back (L). Drill screw holes through the back and into the support [**Drawing 4**]. Drive the screws.

5 To add interior lights, drill ¾" holes through the top panel (H) [**Drawing 11**], and screw the lights in place. Connect the lights and dimmer, following the included instructions. Remove the protective paper from the double-faced tape on the back of the dimmer, and adhere it to the back face of the upper back (L) near the edge. (When placing the cabinet, leave just enough room for your fingers between the cabinet and the wall.)

6 Fasten the hinges to the case and hang the door. Stick a self-adhesive bumper (included with the hinges) to the lip of the door rabbet opposite each hinge [**Drawing 6**]. Install the knob and cam lock. (The lock is optional for the display cabinet.)

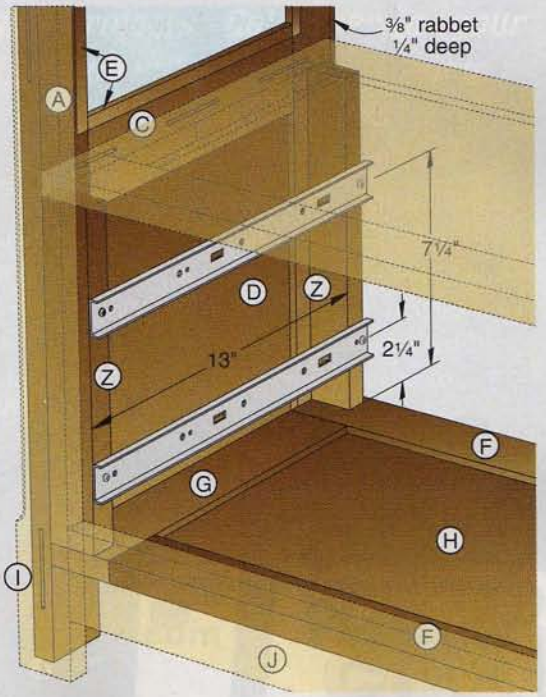
7 To complete the display cabinet, install cushioned shelf supports in the holes in the sides [**Drawing 4c**]. Then, install the shelves.

continued on page 38

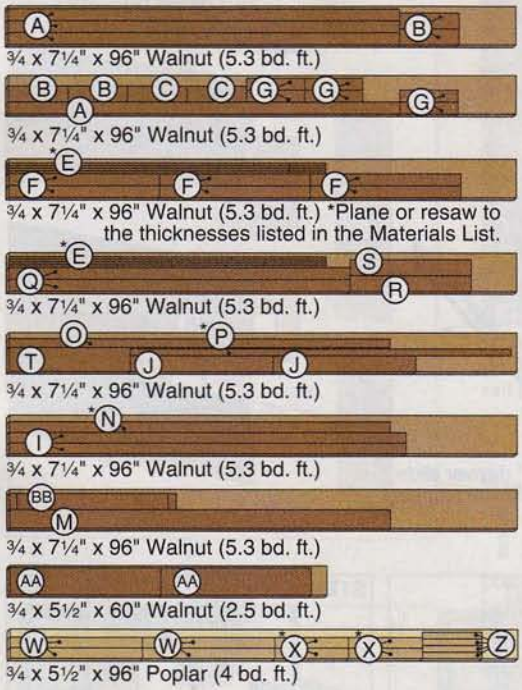
Q INSTALL THE GLASS STOP

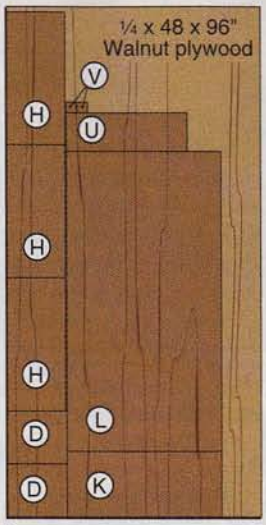
Cover the glass with cardboard and drive a brad into the glass stop (E) pilot hole by sliding the hammer on the cardboard.

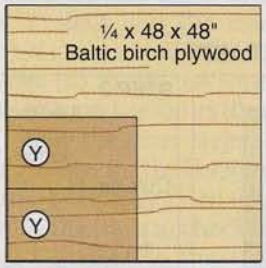
9 DRAWER SLIDE INSTALLATION



Cutting Diagram

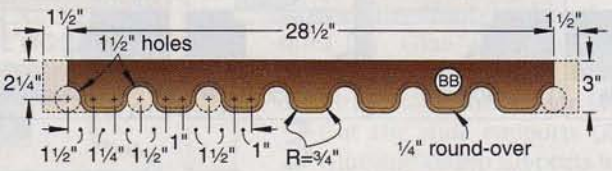

¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 7¼" x 96" Walnut (5.3 bd. ft.) *Plane or resaw to the thicknesses listed in the Materials List.
¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 7¼" x 96" Walnut (5.3 bd. ft.)
¾ x 5½" x 60" Walnut (2.5 bd. ft.)
¾ x 5½" x 96" Poplar (4 bd. ft.)

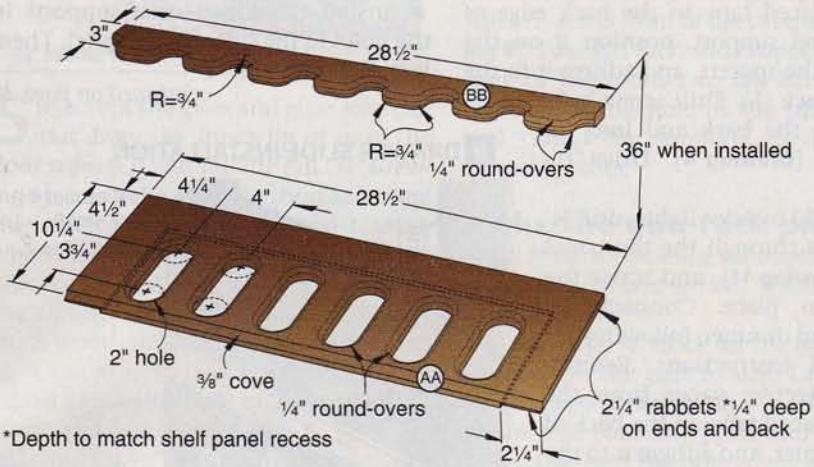




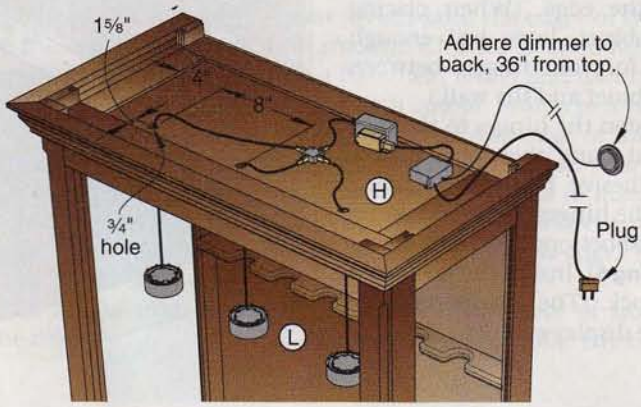
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

10 GUN RACK





11 LIGHTS



Materials List

		FINISHED SIZE T	W	L	Matl.	Qty.
Sides						
A	stiles	¾"	2¼"	74"	W	4
B	rails	¾"	3"	11¼"	W	4
C	middle rails	¾"	3"	11¼"	W	2
D	panels	¼"	11¼"	10"	WP	2
E	glass stop blanks	⅜"	½"	60"	W	8
Bottom, shelf, and top						
F	stiles	¾"	2¼"	28½"	W	6
G	rails	¾"	2¼"	11"	W	6
H	panels	¼"	11"	25"	WP	3
Face frame						
I	stiles	¾"	2"	74"	W	2
J*	rails	¾"	3"	26"	W	2
Backs						
K	lower back	¼"	29¼"	12⅜"	WP	1
L	upper back	¼"	29¼"	56⅜"	WP	1
Base and crown						
M	base blank	¾"	3½"	72"	W	1
N	crown base blank	½"	2"	72"	W	1
O	cap blank	¾"	1⅝"	72"	W	1
P*	bevel blank	½"	1¼"	72"	W	1
Door						
Q	stiles	¾"	2¼"	64½"	W	2
R	bottom rail	¾"	3"	22⅞"	W	1
S	middle rail	¾"	3"	22⅞"	W	1
T	top rail	¾"	4½"	22⅞"	W	1
U	panel	¼"	22⅞"	7¼"	WP	1
V	splines	¼"	2"	2"	WP	2
Trays						
W	fronts and backs	¾"	2"	25"	P	4
X	sides	½"	2"	14"	P	4
Y	bottoms	¼"	13½"	24½"	BP	2
Z	slide supports	¾"	1¼"	11¼"	P	4
Gun rack						
AA	base	¾"	10¼"	28½"	W	1
BB*	barrel support	¾"	3"	28½"	W	1

*Parts initially cut oversize. See the instructions.

Materials key: W–walnut, WP–walnut plywood, P–poplar, BP–birch plywood.
Supplies: #20 biscuits, #8×¾" and #8×1" flathead wood screws (1" only needed for gun cabinet), ⅛" glass (plus ⅜" glass and ⅛" mirror for display case), #17×1" brads, double-faced tape, mirror adhesive (display case only).
Blade and bits: Stack dado set; ¼", ⅜", and ½" rabbet router bits; ¼" and ⅜" cove router bits; ¼" and ⅜" round-over router bits; 3/16" and ¼" brad-point bit; ¾", 1½", and 2" Forstner bits.

Source

Hardware: ⅜" inset self-closing burnished brass hinges with self-adhesive bumpers no. A07565 BB, $1.61 pr. (2 pr.); 1¼" weathered brass knob no. A27030 R2, $3.51; 14" full-extension drawer slide no. KV8400 B14, $11.45 pr. (2 pr.); antique brass cam lock no. N8055 04G 346, $6.79 (optional for display cabinet); cushioned shelf supports, bag of 20, no. G611WPB, $4.60 (display cabinet only); black three-light kit no. WKSW60LCS, $29.56; touch dimmer no. WKA6553CS, $14.61. Woodworker's Hardware, 800-383-0130, wwhardware.com.

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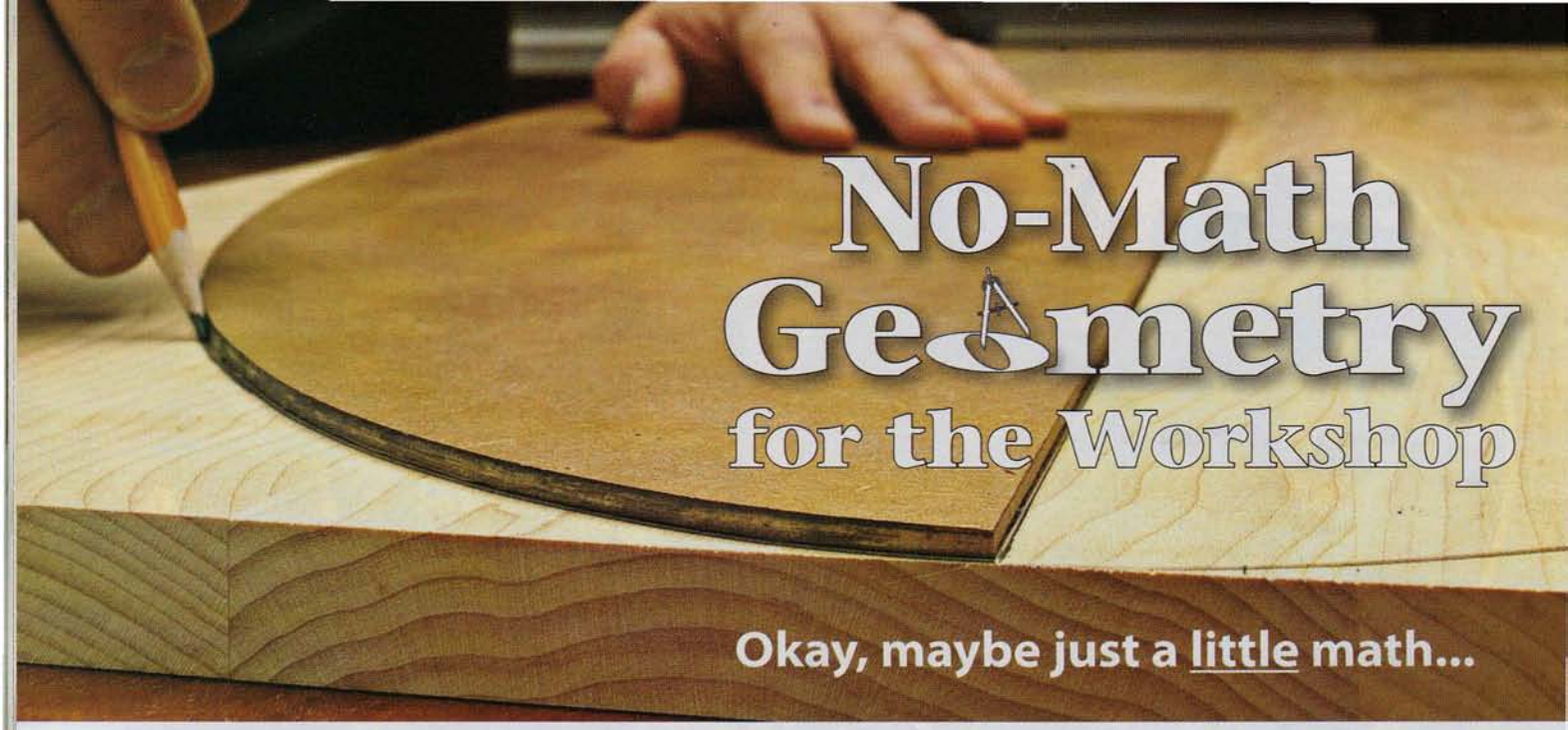


No-Math Geometry for the Workshop

Okay, maybe just a little math...

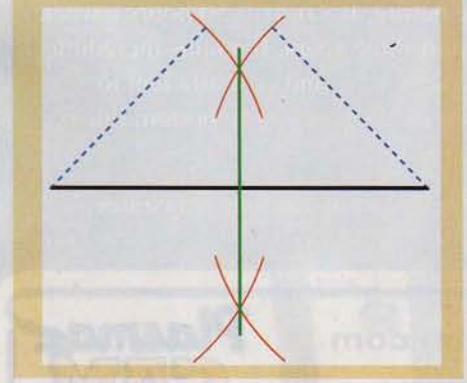
Remember sitting in a high school geometry class thinking, *When will I ever use this stuff?* If you're a woodworker, the answer is *now*. Whether you're making an eight-sided tabletop or rounding off a corner, some basic geometry comes in handy. So take a seat, and get out your pencils, a ruler or yardstick, compass, framing square, and right triangle. Class is about to begin.

1 Divide any line in half

■ **What you'll need:** A compass that can reach more than half the length of the line and a straightedge.

■ **How to do it:** Set the compass legs for just greater than half the length of the line. With the compass point at the left end of the line, scribe arcs above and below the line, as shown in red on **Drawing 1**. Repeat for the right end. Lay a straightedge at the intersections of the arcs, and mark a halfway line, as shown *below* in green.

1 CONNECT THE INTERSECTING ARCS



2 Make an oval top

■ **What you'll need:** A ¾×1½" scrap 4" longer than half the longest dimension of your intended oval, a framing square, a hardboard scrap one-quarter the size of the tabletop, and a sheet of paper half the length of the tabletop.

■ **How to do it:** Tape the paper over half the tabletop blank, and draw horizontal and vertical centerlines on the paper. Double-face tape the framing square to the paper with the outside corner of the square at the centerline intersection and the legs on the lines.

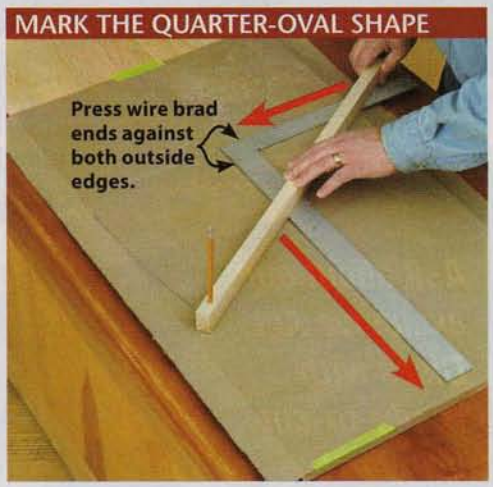
Now make the scribing tool shown in **Drawing 2**. First drill a 9/32" pencil hole into the edge of the ¾×1½" scrap 1" from the end. Divide the oval width and the length in half, and drive 1" wire brads those two distances from the pencil hole center, leaving about ⅛" of the heads exposed. Then insert a pencil through the hole until the point emerges ⅛".

Press both brad heads against the outside edge of the vertical framing square leg—with one brad at the corner—and the pencil on the paper. Press the pencil against the paper while keeping the brads against the edges of the framing square as you move the scribing tool, as shown at *right*. Stop when the pencil reaches the horizontal line; then remove the paper.

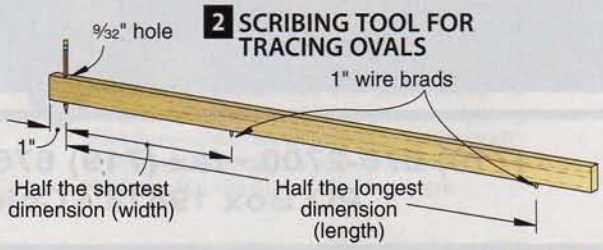
Trim the hardboard to create a 90° corner. Cut the paper pattern on the centerlines and on the waste side of the arc, then spray-adhere this template to the hardboard with the pattern corner in the 90° corner of the hardboard. Bandsaw about ⅛" from the arc, sand to the line, and remove the pattern.

Now draw centerlines on the tabletop blank, dividing it into four parts. Lay the template on the lines to draw a quarter of the oval in each pass, as shown *above*. Flip the template upside down as needed. As with the template, use a bandsaw or jigsaw to trim about ⅛" from the arc. You can then use a bearing-guided router bit against the template to smooth the curves in quarters. (See this layout technique in action at woodmagazine.com/videos.)

MARK THE QUARTER-OVAL SHAPE



2 SCRIBING TOOL FOR TRACING OVALS



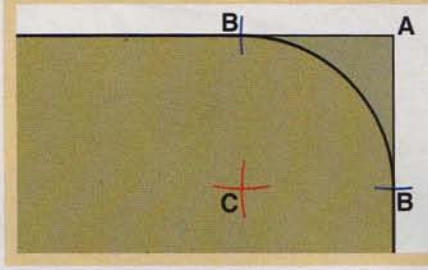
3 Radius any square corner

What you'll need: A compass large enough to span the corner radius.

How to do it: Determine the corner radius you want, and set the legs of a compass that distance apart. With the compass point at the corner of the workpiece (A) on **Drawing 3**, mark arcs (B) on the adjacent edges of the workpiece, as shown in blue. Move the point of the compass to one of the marks (B), and draw an arc, as shown in red. Repeat for the other mark. Then place the compass point at this intersection (C), and draw a quarter-circle from one edge mark to the other.

To cut out the corner, bandsaw or jigsaw to within ⅛" of the arc. Then sand down to the line.

3 CORNER RADIUS



4 Draw a 5-point star or pentagon

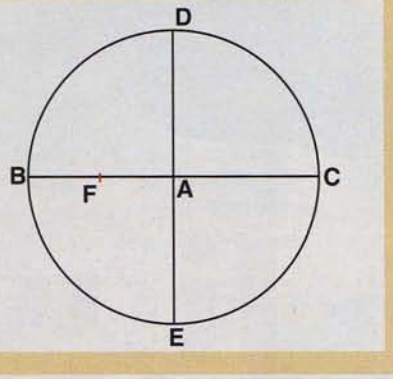
What you'll need: A compass large enough to draw a circle for the outermost points of the star or pentagon, a right triangle, and a ruler or yardstick.

How to do it: Draw a circle the radius you want the star or pentagon to be, and divide the circle in half horizontally to find points B and C, using the indentation from the compass as the center (A). Then divide the circle vertically into quarters using a ruler and a right triangle to find points D and E.

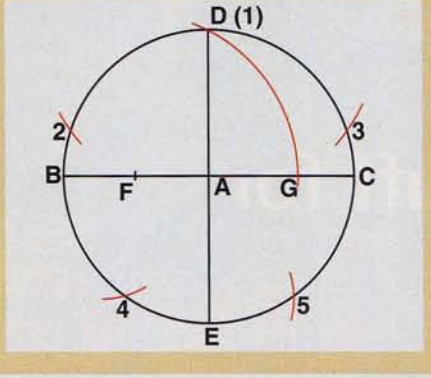
Measure and mark the midpoint (F) between points B and A **[Drawing 4a]**. Then reset your compass to the distance between F and D. With the compass point on point F, strike an arc to mark point G **[Drawing 4b]**.

Reset the compass again for the distance between points D and G, and with the point of the compass at D, mark two arcs on the circle for points 2 and 3. With your compass point at point 2, mark point 4; then use point 4 to mark point 5 **[Drawing 4b]**. Now draw lines between the points to form a pentgon (in blue) or star (in red) **[Drawing 4c]**.

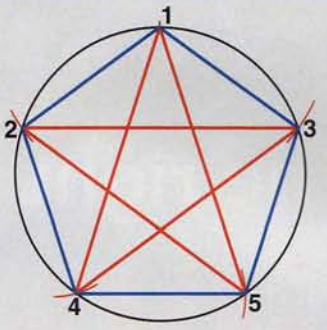
4b BEGIN BY DRAWING A CIRCLE



4a MARK FIVE POINTS



4c ADD LINES TO CREATE A SHAPE

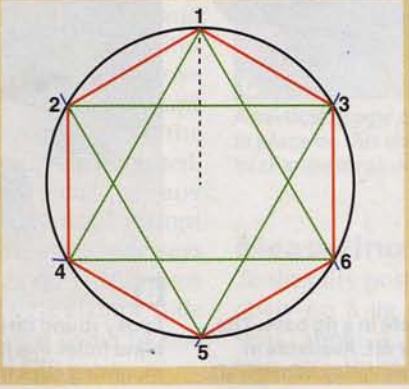


5 Draw a hexagon, equilateral triangle, or 6-point star

What you'll need: A compass and a straightedge.

How to do it: Scribe a circle defining the hexagon corners. Without changing the compass setting, start at point (1) on your circle and make arcs defining points 2 and 3, as shown in blue on **Drawing 5**. From point 2, scribe point 4. At point 4, scribe point 5. Then from point 5, scribe point 6. Next draw lines between the points to form a hexagon (shown in red) or between every other point for an equilateral triangle (shown in green) or star.

5 MARK HEXAGON POINTS USING THE CIRCLE RADIUS

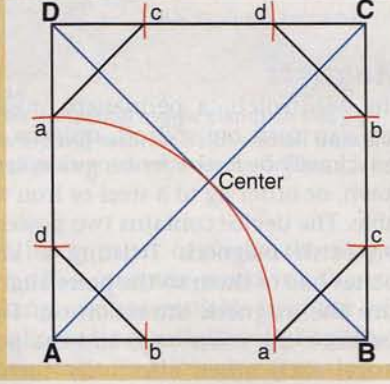


6 Create an octagon from a square

What you'll need: A straightedge that can reach between diagonal corners of the square and a compass that can reach half the length of the diagonals.

How to do it: Draw lines between the diagonal corners of a square to find its center, as shown by the blue lines in **Drawing 6**. Then set your compass point on one corner (A) and the pencil on the center. Without moving the compass point, scribe the two adjacent edges (a, a), as shown by the red arc. Repeat for the other three corners. Then draw diagonal lines between the edge marks at each corner to form an octagon.

6 ARCS MARK OCTAGON CORNERS



The right stuff for Top-Flight Jigs

When you build a jig, you expect it to help you do something more quickly, more easily, more accurately, more safely, or exactly the same time after time. These components and materials will help the next jig you build meet those challenges. Unless noted in the caption, you can buy the parts and materials from all of the **Sources** on *page 44*.

Magnets

The Magswitch, a permanent magnet you can turn on and off, quickly and tenaciously fastens a fence, guide, hold-down, or other jig to a steel or iron tool table. The device contains two powerful rare-earth magnets. Twisting a knob rotates one of them so the poles align to turn the magnetic attraction on. Twist the knob the other way, and the poles cancel each other, effectively turning

MAGNETS: WHEN YOU WANT A JIG WITH STRONG ATTRACTION

A The MagJig fits through a hole in a jig base. The knob turns the magnet on or off. Available in two sizes, about $30 each, Lee Valley, Woodcraft.

B Epoxy round rare-earth magnets into blind holes in a jig. Putting them into steel mounting cups increases magnetic pull.

the magnet off. Several configurations of the Magswitch are available, including the MagJig [**Photo A**], designed specifically for attaching shop jigs, as shown at *left*.

Small rare-earth magnets [**Photo B**] have so much pull that disengaging a jig attached with them may be difficult. Putting in fewer or smaller magnets will alleviate that, but might make the jig more prone to being pushed sideways. Use these permanent magnets for light-duty attachment, such as holding a setting jig or measuring device while you set up a tool. You can usually buy them in bags for $1 apiece or less.

T-track and hold-downs

T-track offers so much versatility, you should make it your first choice for adjustable hold-downs and movable jig parts. Most track accepts T-nuts or T-bolts, but some track accepts standard ¼"-20 hex bolts and nuts [**Photo C**]. You can surface-mount the track, set it into a groove or dado (either ½" or ⅜" deep × ¾" wide), or butt surfaces up against either side.

An inexpensive (less than $10) hold-down clamp [**Photo D**] anchors a workpiece to a jig or locks movable jig parts to a T-slot. Just slip the clamp's bolt into the track, slide the piece to be held under it, and tighten down.

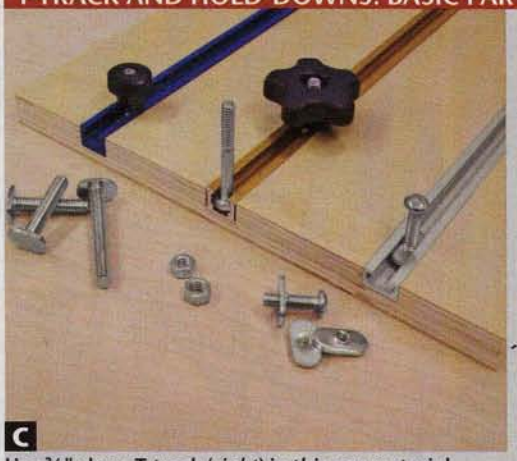
Count on a cam-action hold-down clamp [**Photo E**] to secure a jig or part that's removed or adjusted frequently. The clamp's T-bolt engages the track. A flip of the cam lever tightens or releases the pressure for quick adjustment.

An expansion bar [**Photo F**] secures a jig, such as a feather board, into a miter channel. Turning the knob draws the screw up into the hole, expanding the bar's width slightly so it grips the sides of the miter slot.

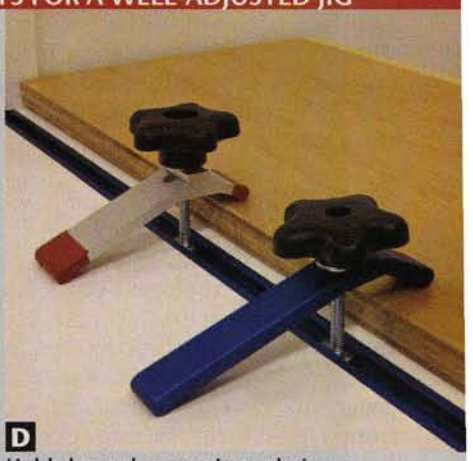
Toggle clamps

Toggle clamps provide quick, positive clamping. Though more complex and more expensive, they often work in situations where T-track hold-downs prove impractical. Install vertical clamps [**Photo G**] to hold a workpiece against the surface where the clamp is mounted, whether vertical, horizontal, or any angle between. Horizontal clamps [**Photo H**] press a workpiece sideways against a fence, such as on a drill-press jig, or a stop. Some toggle clamps slide into T-tracks. The clamps come in several sizes and cost $10–$20 each.

T-TRACK AND HOLD-DOWNS: BASIC PARTS FOR A WELL-ADJUSTED JIG

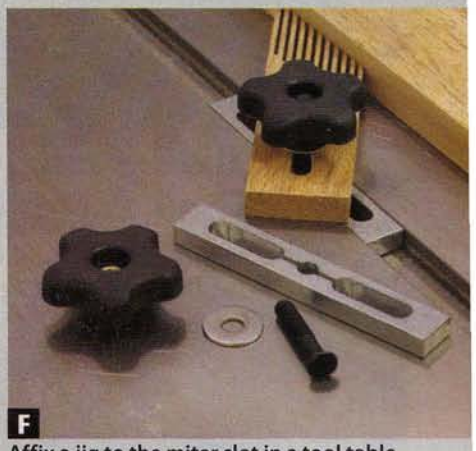


C Use ⅜"-deep T-track (*right*) in thinner material. The track in the center accepts standard hex bolts and nuts. A 4' length of track costs less than $20.



D Hold-down clamps grip workpieces firmly. Increase capacity with a longer T-bolt and a block under the tail.

E Cam-action hold-down clamps thread onto T-bolts or hex bolts to make frequent jig attachment or movement easy. About $9, Rockler, Woodcraft.



F Affix a jig to the miter slot in a tool table with this miter slot hardware kit. $6 for two sets, item 26993, Rockler.

TOGGLE CLAMPS: FLIPPING A LEVER HOLDS ALMOST ANYTHING

G A vertical toggle clamp holds the workpiece firmly in place on this sled. The foot adjusts up or down to change tension or clamp thinner material.

H The horizontal toggle clamp on this jig safely and securely holds a small workpiece against a notched fence for drilling .

Measuring tapes

To simplify positioning a workpiece precisely on a jig or setting an adjustable stop, apply a self-adhesive measuring tape directly to the jig [**Photo I**]. Made of steel, heavy paper, or plastic, these tapes have a PSA (pressure-sensitive adhesive) backing, and are available in either left- or right-reading versions with English or metric scales. To allow easy centering, as

well as accurate measurements in both directions from a point, such as a drill-press chuck or mortising bit, apply left- and right-reading tapes so they meet at the reference point.

Slippery stuff

Parts slide more freely on a low-friction surface of ultra-high-molecular-weight (UHMW) polyethylene. You can buy it as solid stock or self-adhesive tape, often called slick strips or slippery tape [**Photo J**]. When a jig guide slides in a miter-gauge slot or T-track, make the guide from UHMW for smooth movement. For a fence, such as a resawing jig, put a larger piece or several strips on the face. Thin UHMW tape is a quick and less-expensive way to make a slick-sliding surface. The tape is ideal for disposable or limited-use jigs, too. Solid stock generally costs $5–$25, depending on size; rolls of tape sell for $8–$20 each.

Sticky stuff

When you need a jig surface that resists slipping and sliding, high-friction tape [**Photo K**] fits the bill. It's similar to the pads that keep cell phones from sliding off car dashboards. The tape's adhesive backing makes it easy to attach to jig faces. Apply it to the fence of a sliding cutoff table, for instance, so the workpiece won't creep. Or, use it to make a nonskid back on a straightedge guide for a router or circular saw.

Another quick way to slip-proof a jig surface is to apply strips of self-adhesive sandpaper [**Photo L**]. Sold in rolls, the sandpaper has a PSA (pressure-sensitive adhesive) backing that sticks to any smooth, clean surface.

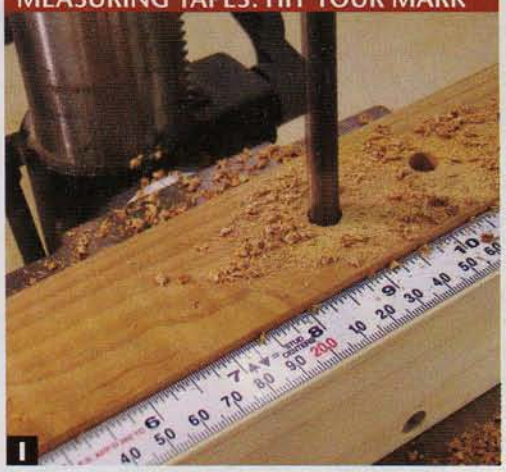
Knobs and handles

A knob lets you tighten or loosen a clamp or other device without tools and can serve as a handle, too. Sometimes, though, you can't find a knob with a threaded stud just the length you need. Snap-Lock knobs solve that problem by snapping onto common ¼", 5⁄16", or ⅜" hexhead hardware-store bolts so you can make a knob with a stud just the length you need [**Photo M**]. Snap a standard hex nut into the knob when you need one with an internal thread.

For positive control, attach a dedicated jig handle [**Photo N**]. It's ideal for sleds and other cutting jigs that need to be pushed firmly and safely.

Written by **Larry Johnston** with **A.J. Hamler**
Illustration by **Michael Burns**

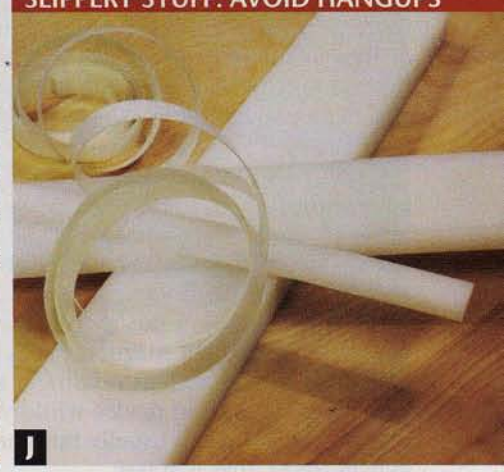
MEASURING TAPES: HIT YOUR MARK



I

A self-adhesive measuring tape attached to a jig simplifies adjustment and work positioning. Tapes read left-to-right or right-to-left.

SLIPPERY STUFF: AVOID HANGUPS



J

Slippery UHMW polyethylene comes as solid stock in many shapes and sizes or as self-adhesive tape. It's ideal for sliding jig bases or fence faces.

STICKY STUFF: KEEP PIECES FROM SLIP-SLIDING AWAY

K

High-friction tape adds grip to a surface to prevent slipping without bonding or clamping. $3.40 for 1×12", item 99K34.01, Lee Valley.

L

Self-adhesive sandpaper on this miter jig prevents slippage. About $13 for 2½"×30' roll, various grits, item 68Z72.01, Lee Valley.

KNOBS AND HANDLES: GET A BETTER GRIP ON THINGS

M

A standard machine bolt or hex nut makes one of these knobs a custom fit for your jig. $20 for 10 of each size, item K15289, Hartville Tool.

N

Screw a handle similar to a plane tote onto a jig to keep your hand from slipping into danger. About $11, item 30876, Rockler.

Sources

Hartville Tool, 800-345-2396, hartvilletool.com; Lee Valley, 800-871-8158, leevalley.com; Rockler, 800-279-4441, rockler.com; Woodcraft, 800-225-1153, woodcraft.com.

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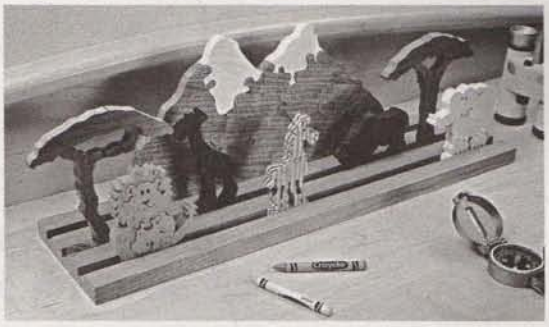

Safari Puzzle
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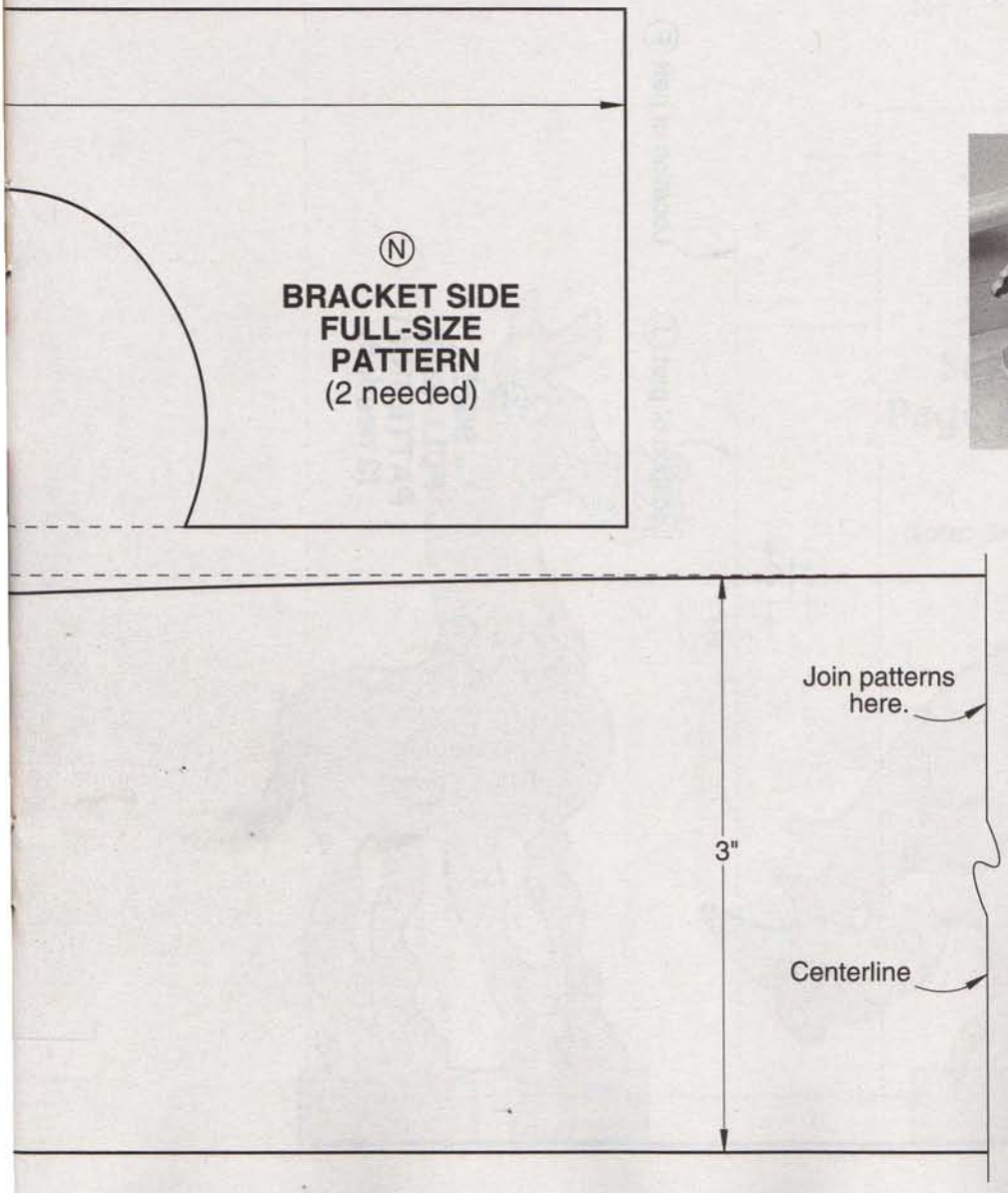

Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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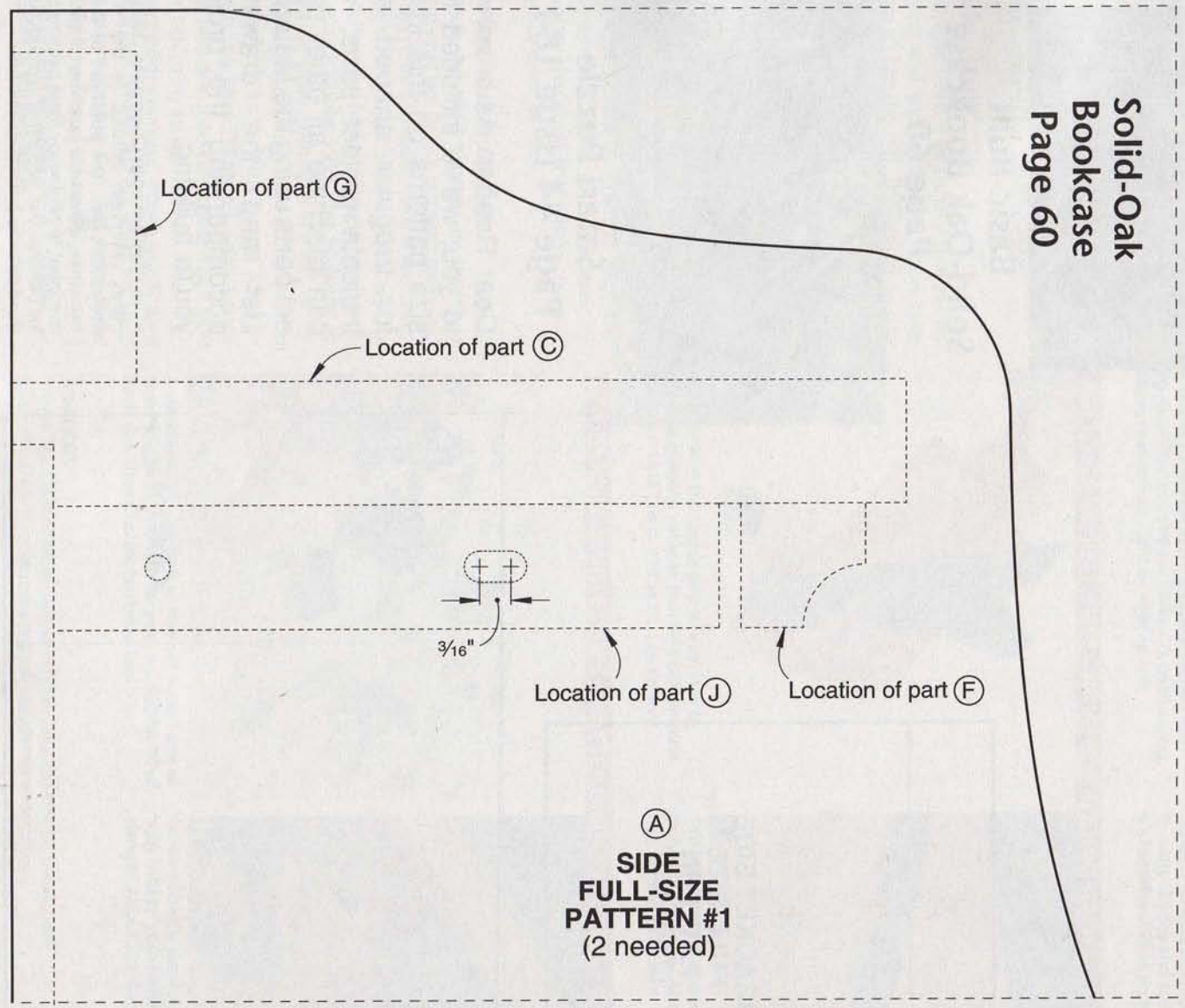
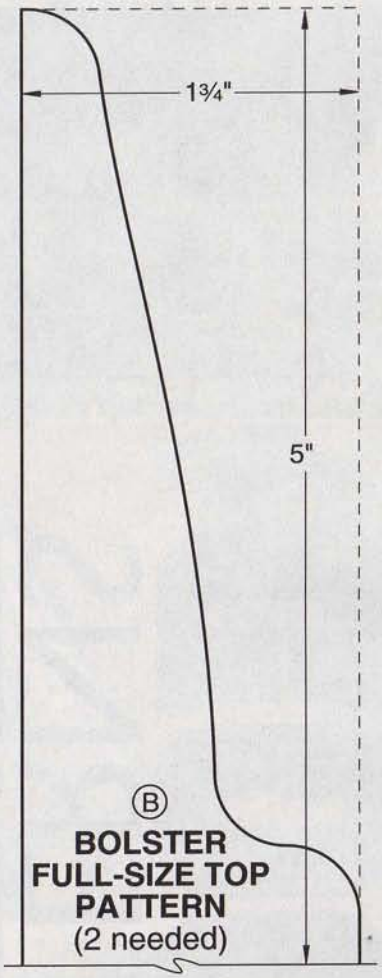
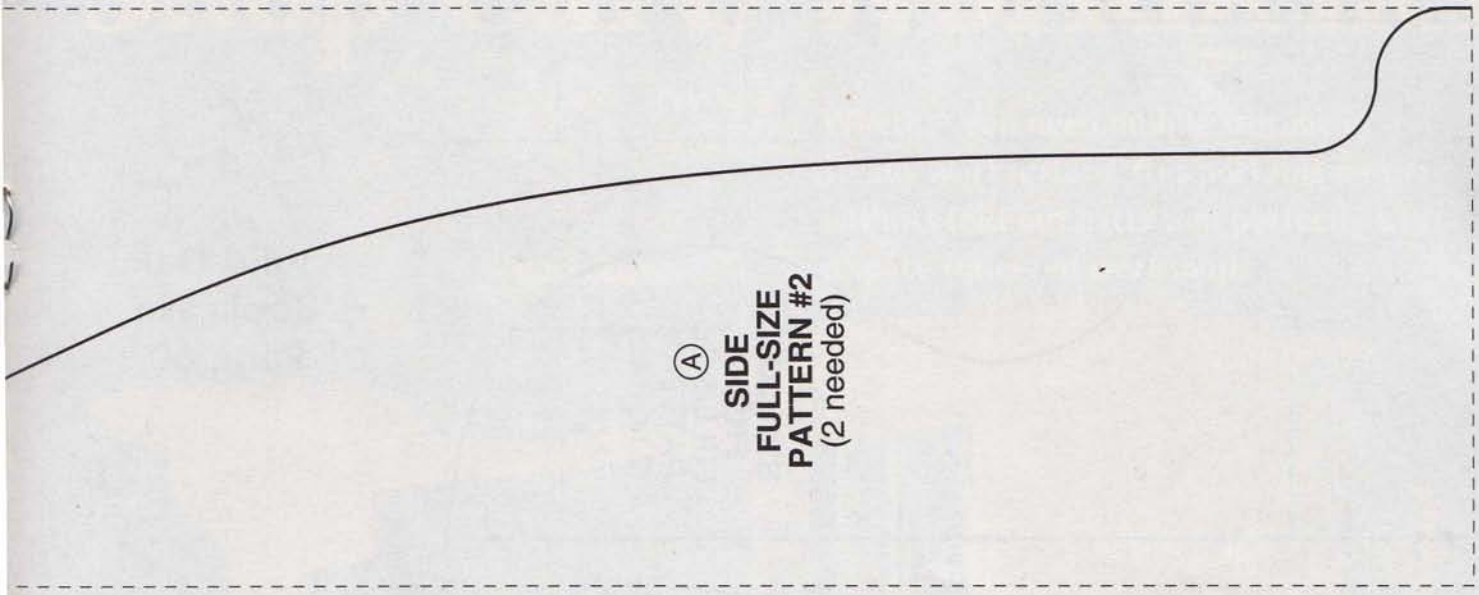


Solid-Oak Bookcase Page 60

Ⓐ
SIDE FULL-SIZE PATTERN #1
(2 needed)



Ⓑ
BOLSTER FULL-SIZE TOP PATTERN
(2 needed)



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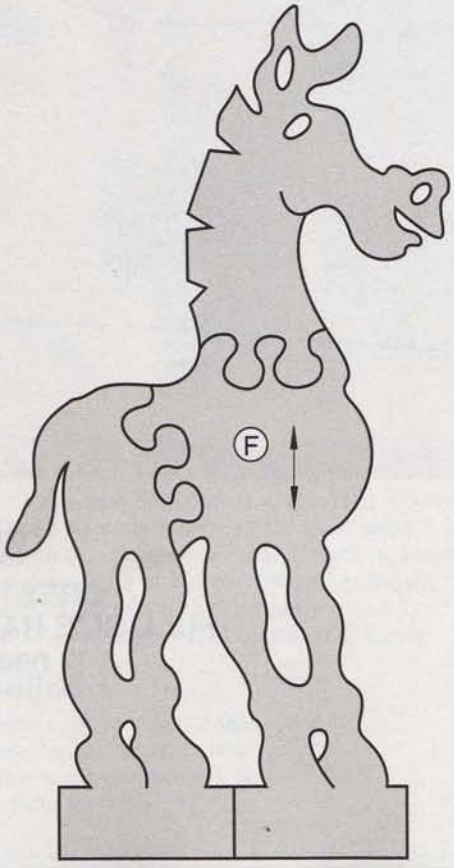
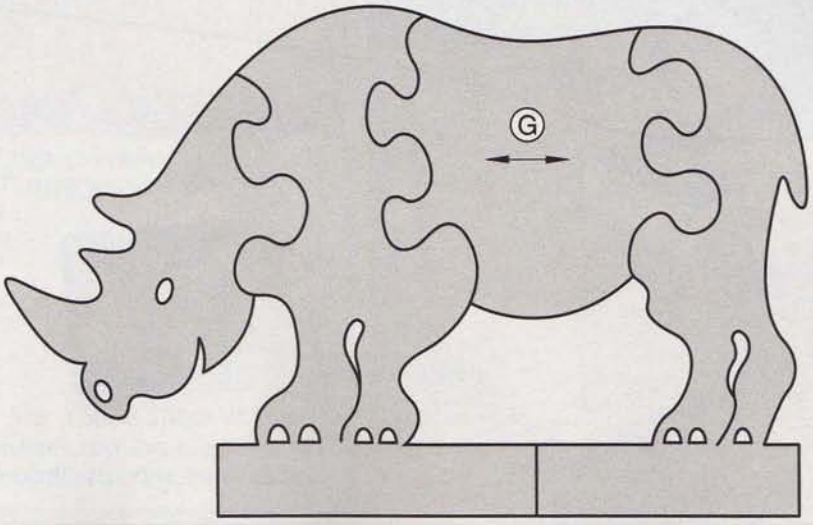
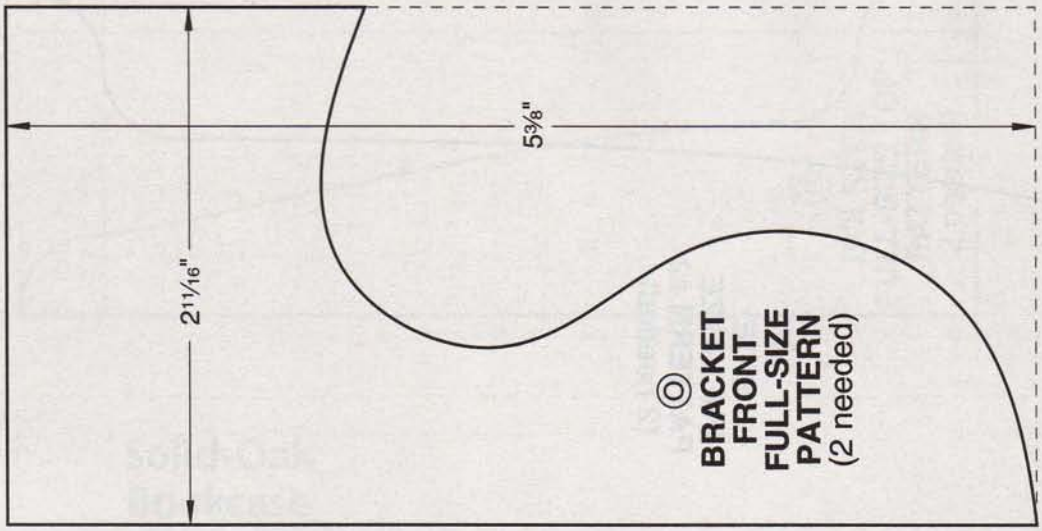
Note: Grain direction







Ⓞ
BRACKET FRONT FULL-SIZE PATTERN
(2 needed)

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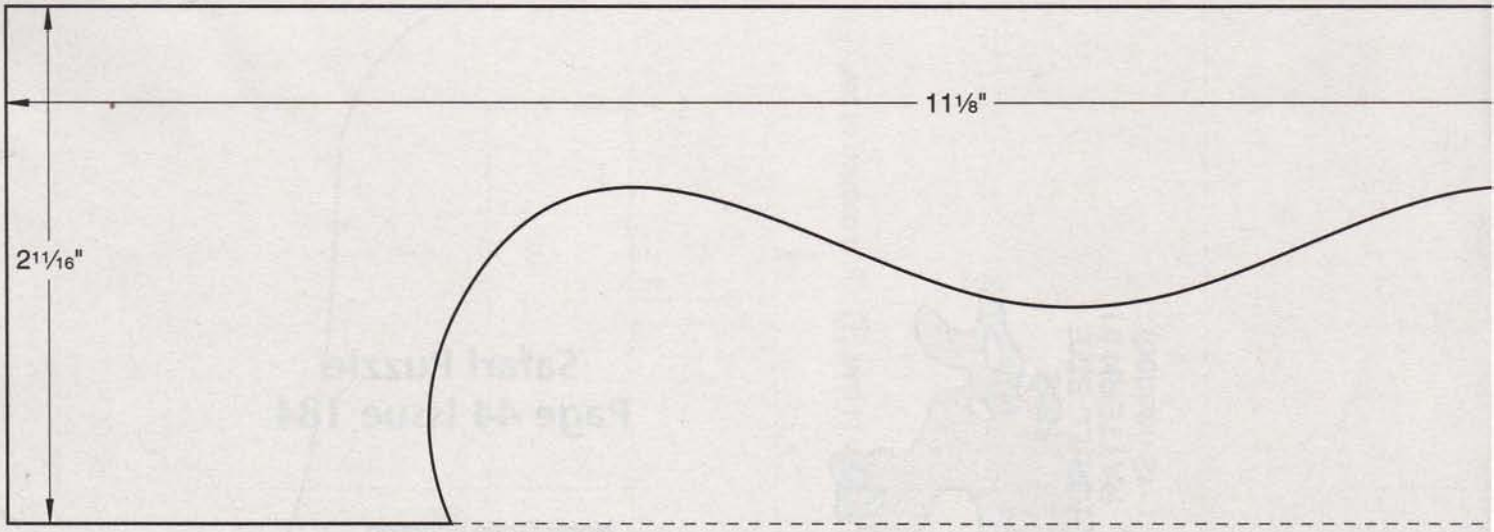
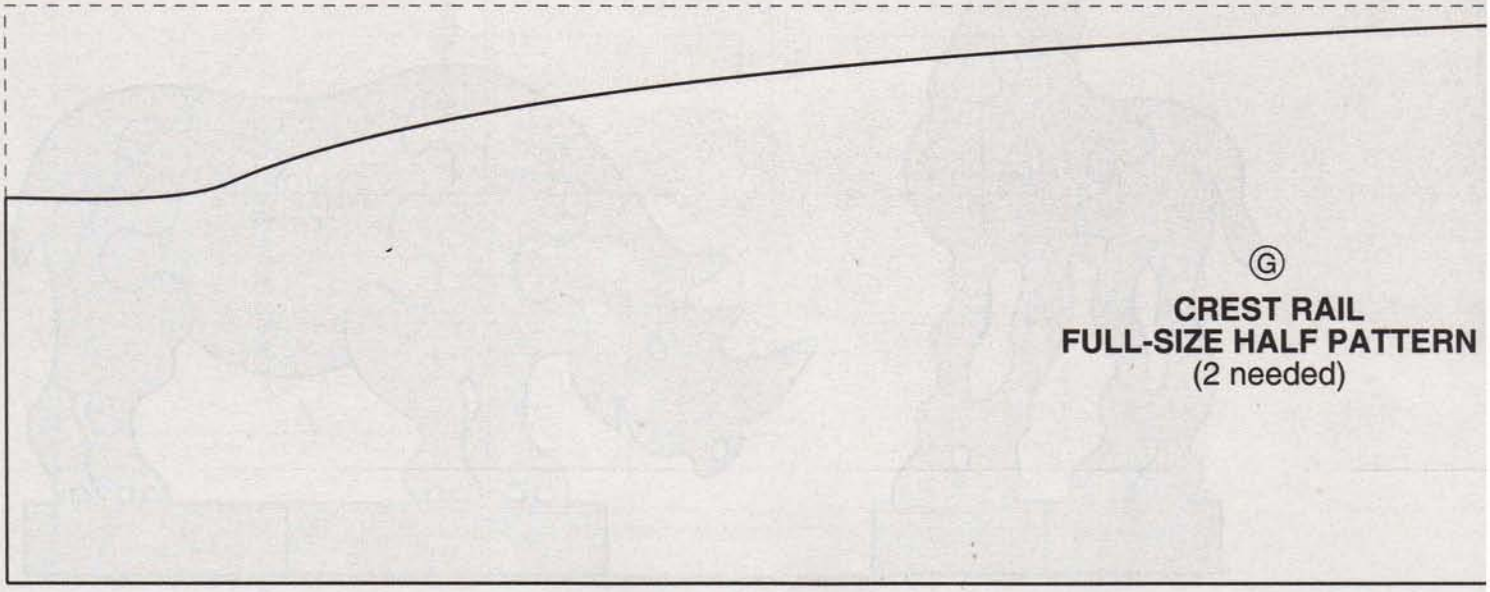


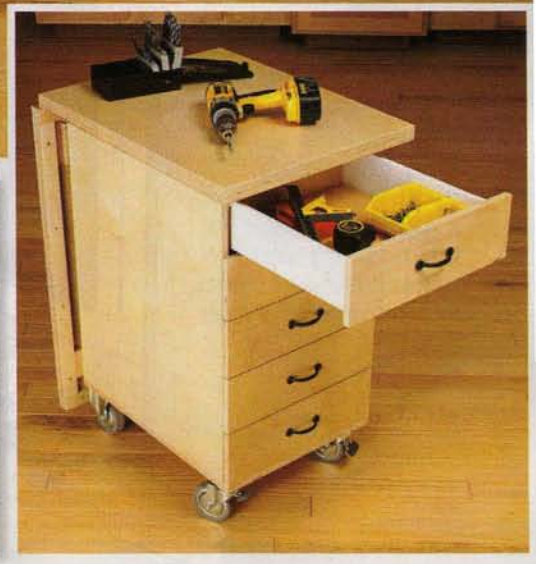


Ⓖ
CREST RAIL FULL-SIZE HALF PATTERN
(2 needed)

Small in size, BIG on storage

Shop Cart/Workbench

Whether you need mobile storage or a steady worksurface, this portable helper with its fold-out extension perfectly suits a space-squeezed workshop.



AT A GLANCE

- Overall dimensions: 26½" wide × 21" deep × 35½" high (on casters).
- Raising the fold-away top creates a 58½" wide × 21" deep worksurface.
- Build it from two sheets of ¾" Baltic birch plywood and a quarter-sheet of 3/16" perforated hardboard.
- Two-way locking swivel casters hold the cart in position when used as a tool or assembly stand.

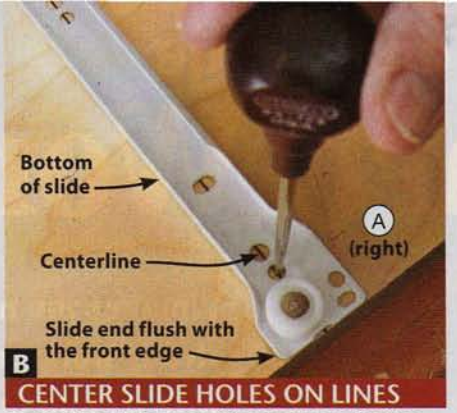
Skill Builders

- Learn how a guide called a story stick helps you repeat layout marks.
- Make sturdy utility drawers using drawer sides with built-in slides.

See a Slide Show of this project coming together at: woodmagazine.com/slides

A MARK SLIDE CENTERLINES

Mark drawer-slide centerlines on both case sides (A). The story stick lets you duplicate those lines on the other case side.



B CENTER SLIDE HOLES ON LINES

Center the slide mounting holes on the line, with the front end of the slide flush with the edge of the side (A).

C ASSEMBLE THE CASE ON ITS BACK

Joining the sides (A), top, and bottom (B) on a flat surface helps prevent racking. Measure between diagonal corners to ensure square.

If you've put off making drawer-based shop storage because you doubt your drawer-making skills, then relax. The combination slides/drawer sides used for this cart eliminate that obstacle.

Begin by building the case

1 Cut the sides (A) and the top and bottom (B) to size [**Materials List,** *page 53*].

2 Cut a 3/16" groove 3/8" deep on the *inside* face of each side [**Drawing 1**].

3 Tape a 3/4×2×30" story stick to the front edge of a side (A), keeping one end of the stick flush with the bottom end of the side [**Photo A**]. Use a square to draw centerlines where shown [**Drawing 1**] on the side and the story stick. Remove the story stick, retape it on the other case side, and transfer the story stick lines to the other side part.

4 Sort the case-mounted parts of the drawer side slides into left and right sides. (Wheels on the case-mounted slide should be closest to the bottom.) Center a case-mounted slide on one of the case side (A) layout lines [**Photo B**], and punch screw-starting holes with an awl. Repeat for the remaining slides on both case sides.

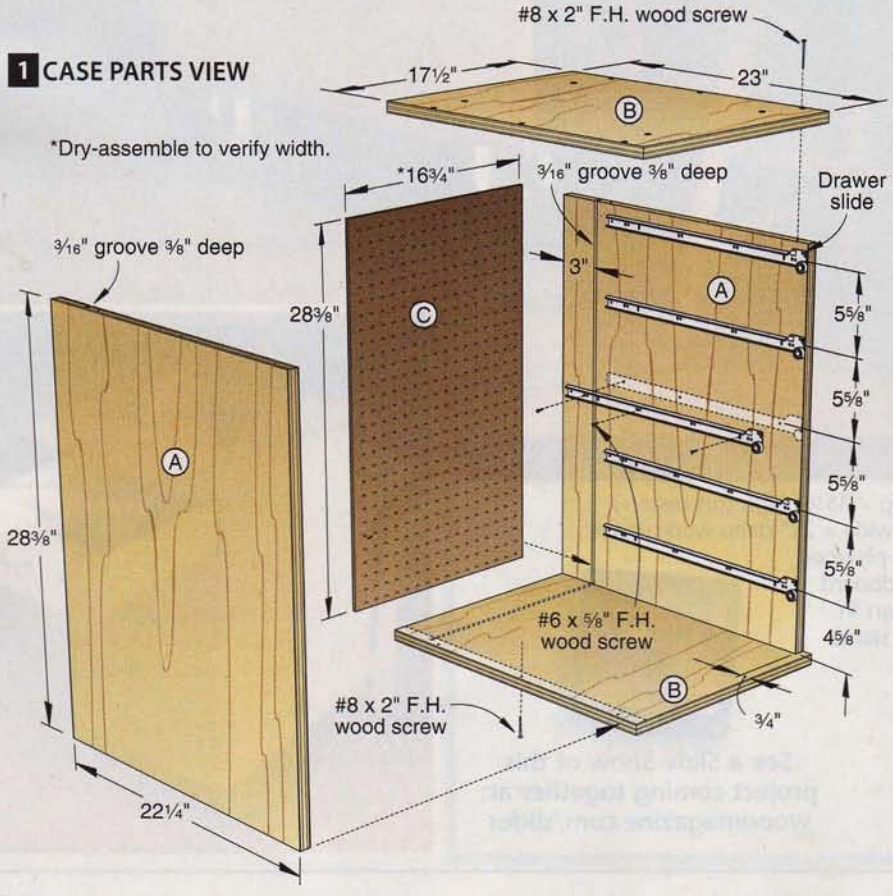
5 Wrap tape around a 3/32" bit, with the tape edge 5/8" from the bit tip for a visual depth stop. At each awl mark on the sides (A), drill a 3/32" pilot hole 5/8" deep, and mount the slides. Screw the slides to the sides.

6 On the underside of the top (B), drill countersunk mounting holes [**Drawing 2**] to later attach the fixed top (E). (For all #8 screws, drill countersunk 5/32" shank holes and 7/64" pilot holes.)

7 Drill countersunk shank holes into the top and bottom (B) and pilot holes in the sides (A) [**Drawing 1**]. Dry-assemble the sides to the top and bottom, and measure between the bottoms of the grooves on the sides.

8 Cut the back (C) to length and the measured width. Then disassemble the case.

9 Glue and screw the sides (A) to the bottom (B). Insert, but don't glue, the back (C) and glue and screw the top to the sides [**Photo C**].



Make and mount the tops

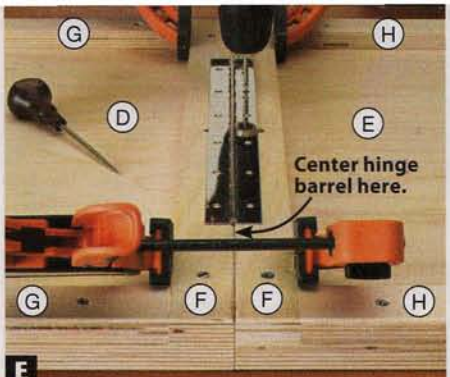
1 Cut the folding top (D), fixed top (E), stiles (F), rails (G,H), and leg rail (I) to size.

2 Glue, clamp, and screw the rails and stiles flush to the edges of the fixed and folding tops [**Drawing 2**, **Photo D**].

3 Sand the stile and rail edges of both tops (D, E). Rout a 1/8" round-over along the top and bottom edges of both tops [**Drawing 2**].

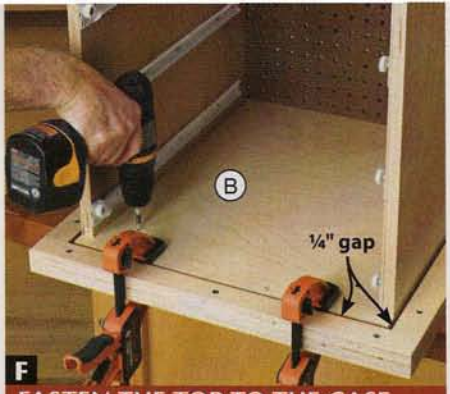
D ASSEMBLE THE FOLDING TOP

Glue and screw a stile (F) and rail (G) to the folding top (D). Then attach the leg rail (I), followed by the other stile and rail.



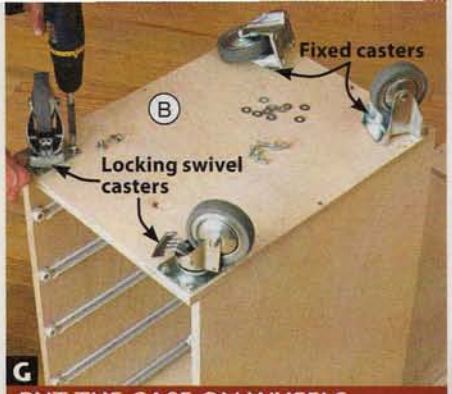
E MOUNT THE CONTINUOUS HINGE

Clamp the tops together while attaching the hinge to ensure a gap-free surface when the folding top is raised.



F FASTEN THE TOP TO THE CASE

Allow a ¼" gap between the stiles and rails of the fixed top and the case top before driving the mounting screws.



G PUT THE CASE ON WHEELS

Mount the locking swivel casters beneath the drawer opening end of the case to make the locking lever easy to reach.

4 Clamp the tops upside down and end to end on a flat surface **[Photo E]** with the leg rail (I) away from the butted edges. Center a 12" continuous hinge on the joint, and drill pilot holes to suit the screws supplied. Then fasten it in place.

5 Center the case (A/B) between the stiles and rails on the upside-down fixed top (E). Fasten it in place **[Photo F]** using four mounting holes in the top (B).

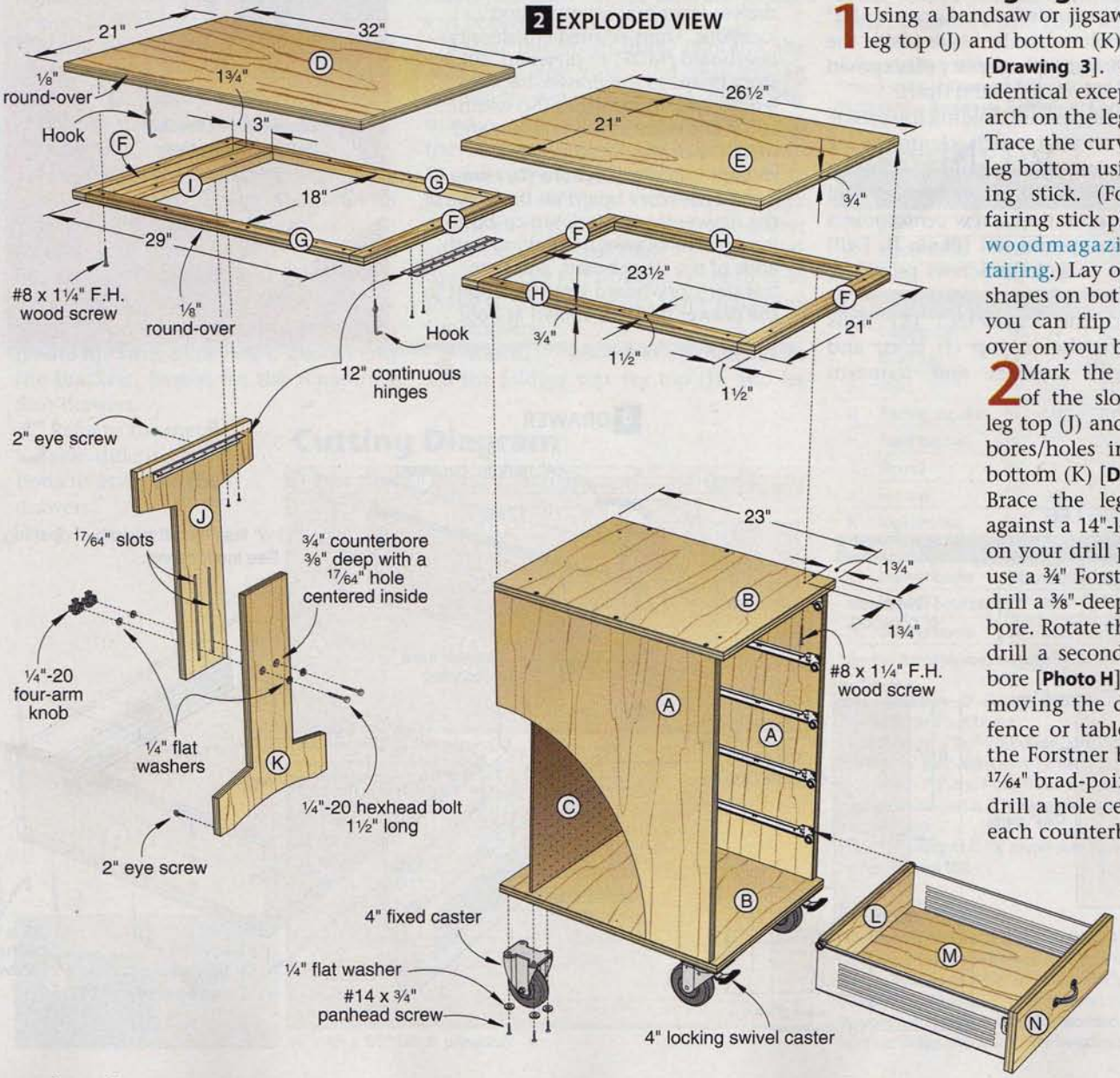
6 Place a locking swivel caster flush with the front and side edges of the bottom (B), then mark and drill pilot holes ⅝" deep **[Drawing 2]**. Mount the caster **[Photo G]**. Repeat for the other front swivel caster. Now mark, drill, and mount the rear fixed casters.

Add a folding leg

1 Using a bandsaw or jigsaw, cut the leg top (J) and bottom (K) to shape **[Drawing 3]**. Both are identical except for the arch on the leg bottom. Trace the curve on the leg bottom using a fairing stick. (For a free fairing stick plan, go to woodmagazine.com/fairing.) Lay out the leg shapes on both sides so you can flip the parts over on your bandsaw.

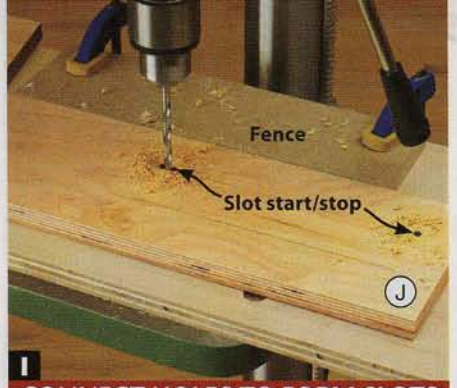
2 Mark the locations of the slots in the leg top (J) and counterbores/holes in the leg bottom (K) **[Drawing 3]**. Brace the leg bottom against a 14"-long fence on your drill press, and use a ¾" Forstner bit to drill a ⅜"-deep counterbore. Rotate the leg and drill a second counterbore **[Photo H]**. Without moving the drill press fence or table, replace the Forstner bit with a 17/64" brad-point bit and drill a hole centered in each counterbore.

2 EXPLODED VIEW



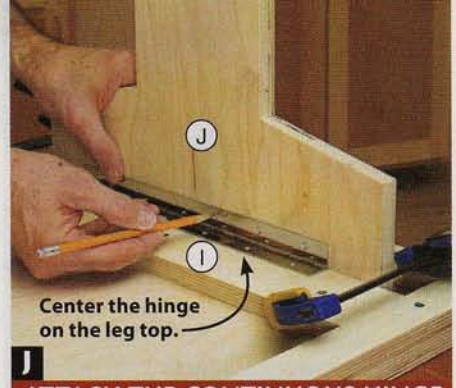
H DRILL LEG HOLES

The fence remains in the same position for drilling counterbores and holes in the leg bottom (K) and slots in the leg top (J).



I CONNECT HOLES TO FORM SLOTS

Drill 17/64" holes 3/8" apart, then drill away the waste between the holes to form slots in the leg top (J).



J ATTACH THE CONTINUOUS HINGE

First attach one leaf to the leg rail (I). Attach the other leaf to the leg top (J) second to allow clearance for a drill/driver chuck.

3 Without moving the fence, drill holes at each end of a leg top (J) slot layout line. Then drill overlapping holes [**Photo I**] until you form a slot with smooth sides. Rotate the leg and repeat to create the second slot.

4 Insert ¼" washers into the leg bottom (K) counterbores. Epoxy ¼×1½" hexhead bolts with the heads inside the counterbores, keeping epoxy off exposed threads. Let cure and sand flush.

5 With the case and folding top upside down on your bench, clamp the leg top (J) against the leg rail (I). Center a 12" continuous hinge on the leg and mark the mounting screw centerpoints on the leg top and rail [**Photo J**]. Drill pilot holes to suit the screws provided, and mount the hinge.

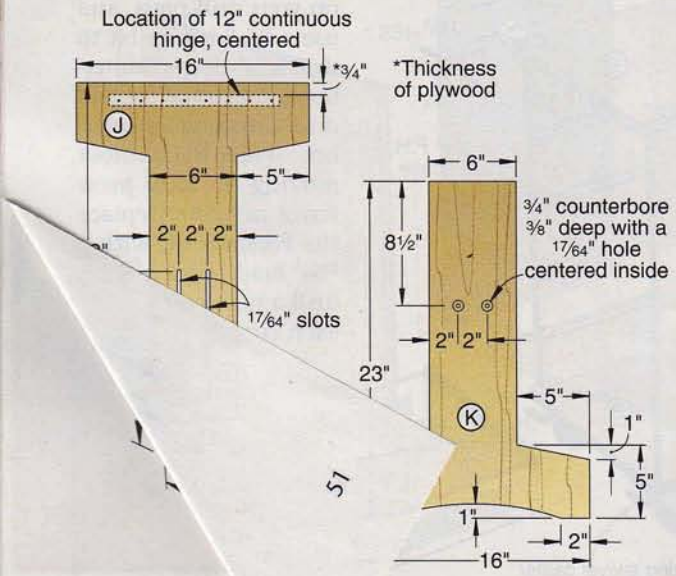
6 Extend the leg-bottom (K) bolts through the leg-top (J) slots, and secure with washers and four-arm knobs.

SHOP TIP

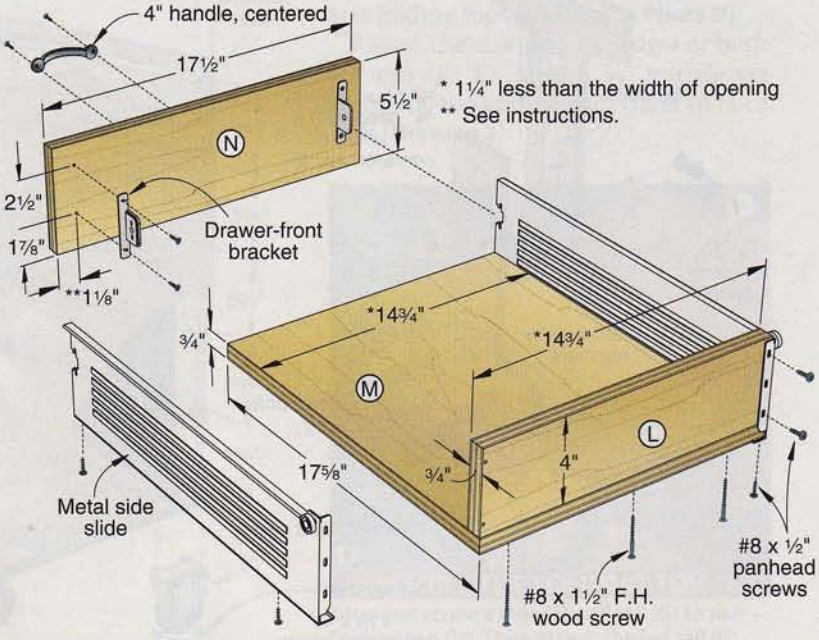
A story board ensures a happy layout ending

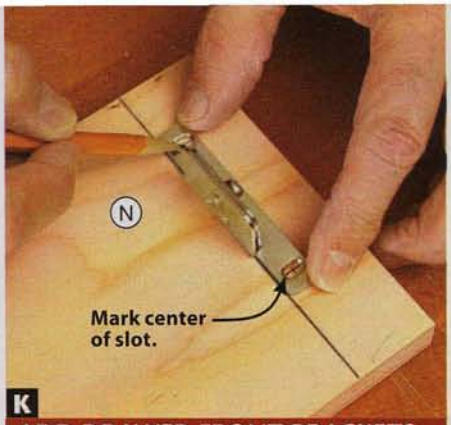
Save time, increase accuracy, and avoid repetitive measurements by creating a story board to lay out drawer-front bracket mounting locations. From ¼" medium-density fiberboard (MDF) or plywood, cut a story board to the drawer-back (L) length and drawer-front (N) width. Label one edge as the bottom, and mark the drawer-front bracket mounting screw locations [**Drawing 4**]. Center the story board on the *inside* of the drawer front. Mark top-to-bottom lines on the drawer front along both ends of the story board, and then transfer story-board screw locations to the drawer front, as shown at *right*.

3 FOLDING LEG



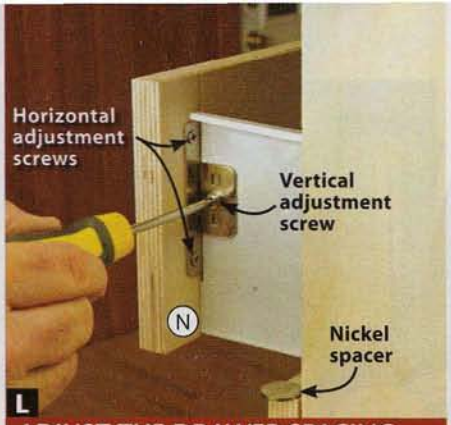
4 DRAWER





K ADD DRAWER-FRONT BRACKETS

Center bracket mounting screws in the slots to horizontally adjust the drawer front.



L ADJUST THE DRAWER SPACING

The drawer-front bracket can be loosened to fine-tune the drawer-front position.

M INSERT THE HOOK-AND-EYE LATCHES

Drill and insert the hook eye. Then position the second eye to hold the leg in place.

Build drawers the fast way

1 Measure the distance between the sides (A). If that dimension equals 16", cut the drawer backs (L) and drawer bottoms (M) to the sizes in the **Materials List**. If not, subtract 1¼" from that dimension and substitute that for the drawer-back length and bottom width.

2 Drill and countersink shank holes in the drawer bottoms (M) and pilot holes in the backs (L) [**Drawing 4**]. Glue and screw the backs to the bottoms.

3 Cut the drawer fronts (N) to size. Drill holes for the handle screws.

4 Use the story board **Shop Tip** on *page 52* to lay out the drawer-front bracket mounting locations. Align a bracket on the drawer front (N) with the slots over the mounting location lines. Mark the centers of the mounting slots [**Photo K**]. Drill pilot holes, and mount the brackets. Repeat for the remaining four drawers.

5 Refer to the metal side slide instructions to assemble the drawers.

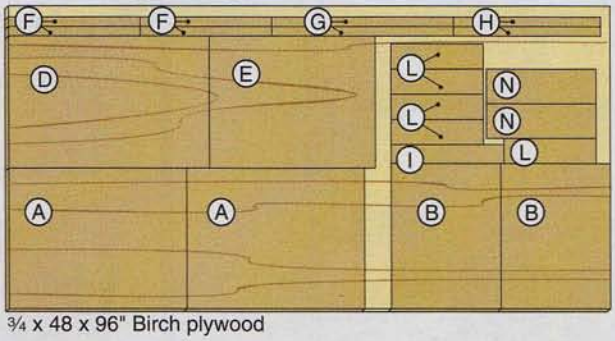
Finish up and get rolling

1 Remove all hardware and disassemble the drawers. Then remove the fixed top from the case. Sand all parts to 180 grit, remove the dust, and apply three coats of finish. (We used Minwax Polycrylic satin finish, sanding to 220 grit between coats.)

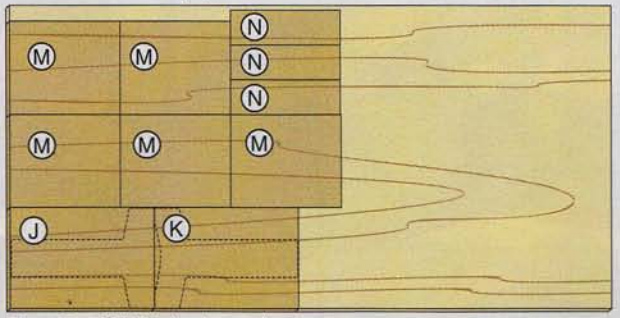
2 After the finish dries, remount the top to the case, and reattach all hardware. Reassemble and insert the drawers, and adjust the spacing between the drawers using the drawer-front brackets [**Photo L**]. Use nickel spacers to provide a 1/16" gap between drawers. (There's a ½" gap between the top drawer and the case.) Then number the outside drawer backs 1–5 from top to bottom to preserve these spacings after removing the drawers.

3 Attach 2" hook-and-eye latches to the folding top, leg top (J), and leg bottom (K) [**Drawing 2**]. One latch holds the leg in its folded position [**Photo M**] while the folding top is stowed. The latch on the folding-top stile (F) and leg bottom keep the leg from accidentally swinging sideways when lowered. Now you're ready to fill the drawers with your tools or supplies, and go to work.

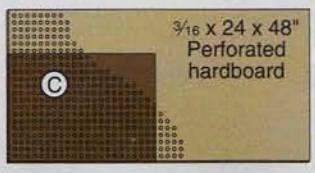
Cutting Diagram



¾ x 48 x 96" Birch plywood



¾ x 48 x 96" Birch plywood



Written by **Bob Wilson** with **Chuck Hedlund**
Project design: **Conrad Kuharic** and **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

Case		FINISHED SIZE T	W	L	Matl.	Qty.
A	sides	¾"	22¼"	28⅜"	BP	2
B	top/bottom	¾"	23"	17½"	BP	2
C	back	3/16"	16¾"*	28⅜"	PH	1
Tops						
D	folding top	¾"	21"	32"	BP	1
E	fixed top	¾"	21"	26½"	BP	1
F	stiles	¾"	1½"	21"	BP	4
G	folding top rails	¾"	1½"	29"	BP	2
H	fixed top rails	¾"	1½"	23½"	BP	2
I	leg rail	¾"	3"	18"	BP	1
J	leg top	¾"	16"	23"	BP	1
K	leg bottom	¾"	16"	23"	BP	1
Drawers						
L	drawer backs	¾"	4"	14¾"	BP	5
M	drawer bottoms	¾"	14¾"	17⅝"	BP	5
N	drawer fronts	¾"	5½"	17½"	BP	5

*May vary due to plywood thickness. See the instructions.

Materials key: BP–Baltic birch plywood, PH–perforated hardboard.
Supplies: ¼"-20x1½" hexhead bolts (2); #8x½" and #14x¾" panhead screws; ¼" flat washers; #6x⅝", #8x1¼", #8x1½", and #8x2" flathead wood screws; 12" continuous hinges (2); 2" hook-and-eye latches (2); five-minute epoxy.
Bits: 3/16" straight bit, ⅛" round-over bit, ¾" Forstner bit, 17/64" brad-point bit.

Source

Hardware: Metal side slides no. 12K38.45, $8.70 pair (5); 4" metal handles in oil-rubbed bronze finish, no. 02W26.26, $3.95 each (5); ¼"-20 four-arm knobs no. 00M55.40, $1.90 each (2); 4" caster set no. 00K20.10 includes two locking-swivel and two fixed casters, $45; from Lee Valley, 800-871-8158 or leevalley.com.

SHOP TESTED

14" Bandsaws

We tested 8 models priced at $550 or less, and found several that stood out.

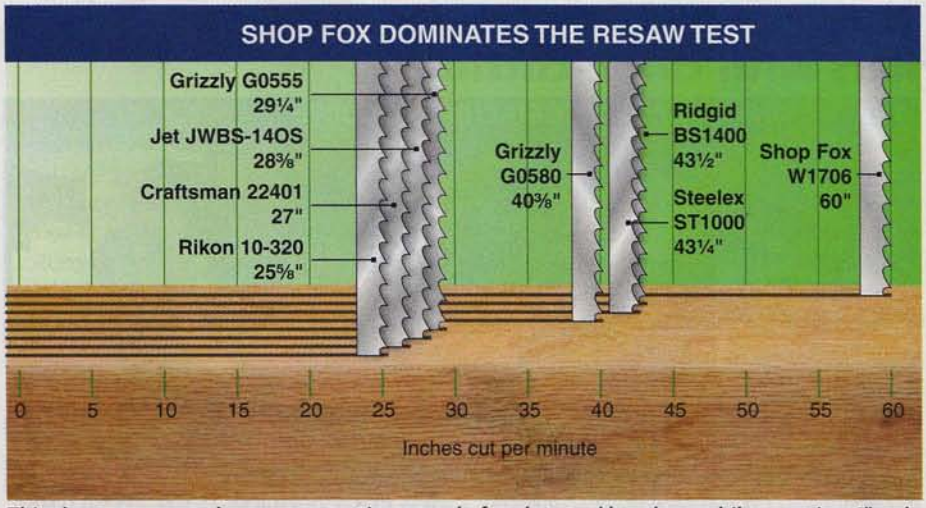
If you're looking to buy your first bandsaw or simply upgrade from a benchtop model, consider a low-cost 14" bandsaw for your shop. Read on to learn which machines performed best.

It's no monster truck, but you do need power

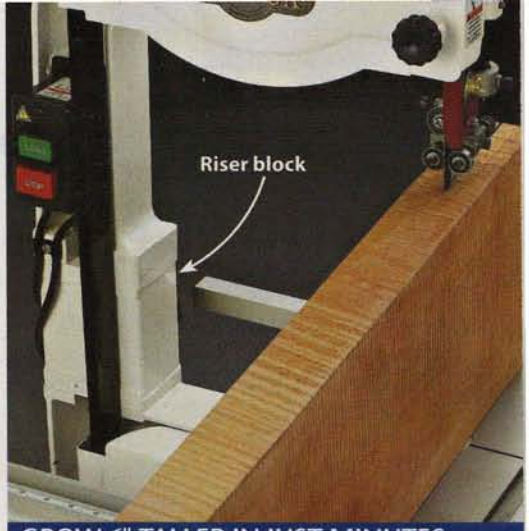
After setting up and fine-tuning the machines, we outfitted each saw with a brand-new ½"-wide, 3-teeth-per-inch (tpi) Carter Accu-Right blade, tensioning the blade by hand. (Rather than relying on the saw's scale, we adjusted the tension until, with the blade guides at full height, we could push the blade sideways ¼".) To break the saw in, we first ripped and crosscut 4/4 and 8/4 red oak at various feed rates, and all models handled the tasks with no difficulty, although the Ridgid

Watch FREE bandsaw videos and get more bandsaw tips and techniques at: woodmagazine.com/bandsaw.

During the initial setup of each saw we backed the blade guides away from the blade before adjusting its tracking on the wheels.


SHOP FOX DOMINATES THE RESAW TEST
Grizzly G0555 29¼"
Jet JWBS-14OS 28⅜"
Craftsman 22401 27"
Rikon 10-320 25⅝"
Grizzly G0580 40⅜"
Ridgid BS1400 43½"
Steelex ST1000 43¼"
Shop Fox W1706 60"
0 5 10 15 20 25 30 35 40 45 50 55 60
Inches cut per minute

This chart compares the average cutting speed of each tested bandsaw while resawing 6" red oak fed by hand as fast as the saws could handle, using identical 3-tpi ½" blades.



GROW 6" TALLER IN JUST MINUTES

Add a riser block to a cast-iron C-frame bandsaw and gain 6" of resaw capacity. You'll also need longer blades when you do this.

BS1400 vibrated significantly. Installing a Power Twist link belt reduced that shaking somewhat, but it still vibrated more than the others. And vibration makes precision cutting difficult.

Because bandsaws excel at resawing—standing a board on edge and cutting off thin slabs—many of you employ them to get more use from prized figured or exotic stock. Most of these saws can fit boards up to 6" wide between the upper blade guides and table (except the Craftsman 22401, which maxes out at just over 8"), a real challenge in hard, dense wood. So for our next test we resawed ¼"-thick panels from 6"-wide oak—hand-feeding the wood as fast as each saw could cut it. Here we saw important differences. (See the chart *above*.) The Shop Fox W1706 blazed through the oak, averaging 60" per minute, thanks to its muscular 1-hp-rated motor and cast-iron wheels that transfer torque to the cut.

After that you can pretty much ignore horsepower ratings as a measure of absolute cutting power. The ¾-hp-rated Grizzly G0580, Ridgid, and Steelex ST1000 outpowered several saws with 1-hp-rated motors.

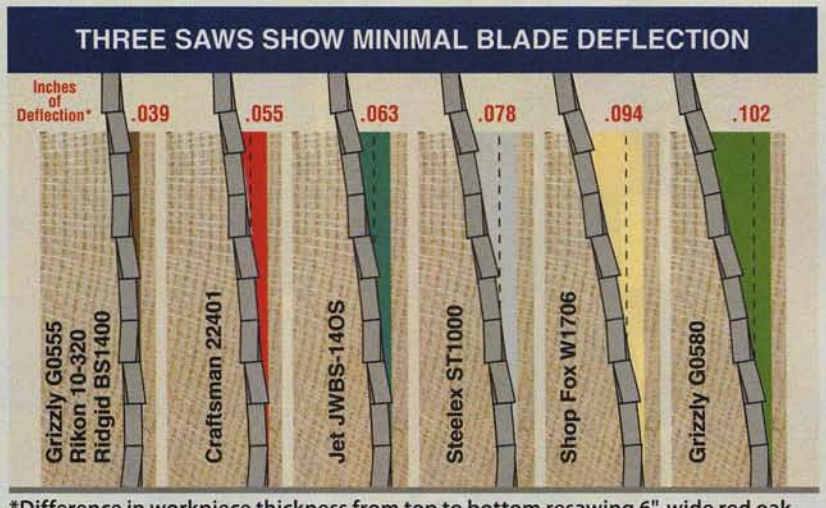
Next, we installed riser blocks, shown *above*, on the Shop Fox and both Grizzly saws—performers at three levels in our resawing-power test—adding 6" to their resaw capacities. We found all three could power through 12"-wide oak boards at slower feed rates. You can also add optional riser blocks to the Jet, Ridgid, and Steelex saws, but not to the steel-frame Craftsman and Rikon.

The Verdict: All impressed us, but one strike against the Ridgid BS1400 for excessive vibration.

Don't let blade deflection eat up your workpiece

Blade guides above and below the table keep the blade from twisting and deflecting side-to-side during cuts. A blade that deflects does not cut perpendicular to the table, so your workpiece might wind up thicker at the top than at the bottom, or vice versa. As you can see at *right*, the Grizzly G0580, Shop Fox, and Steelex saws showed the most blade deflection. We tried various feed rates, blade tensions, and guide settings, but the results proved consistent. These resawn pieces would still need planing to achieve a consistent thickness, and removing nearly ⅛" of material to get there defeats the purpose of resawing (to save stock). The Grizzly G0555, Rikon 10-320, and Ridgid demonstrated the least deflection (about 1/32"), even when we pushed the wood hard. In 6" oak, the Craftsman saw performed nearly as well, but at its 8 3/16" capacity it deflected as much as the Grizzly G0580.

With all the bandsaws, however, we found no significant deflection when sawing through stock less than 2" thick. Adding riser blocks to the saws that accept them didn't affect blade deflection: It was similar to the 6" resaw test.



*Difference in workpiece thickness from top to bottom resawing 6"-wide red oak. Average of three tests using identical 3 tpi ½" bandsaw blades.

The Verdict: Excessive blade deflection puts the Grizzly G0580, Shop Fox, and Steelex on probation.

There's no cutting corners with curve-cutting

To test each saw's ability to cut inside and outside curves, we installed new ¼"-wide, 6-tpi Carter blades, and cut out a block "S" with each saw. The Jet JWBS-14OS and Shop Fox followed the lines so well, it felt as if they were on autopilot. Ridgid's vibration made it difficult to follow the lines, leaving ragged edges.

Next, we cut out 1¼"-diameter holes, and each bandsaw performed well. But when we pushed the machines to cut a tighter radius, the Grizzly G0555, Jet, and Shop Fox excelled; Craftsman and Ridgid struggled.

We switched to a ½" blade for larger circles. All saws handled a 5"-diameter cut, but a 4" one proved too tight for the Ridgid and Steelex without backing up and starting again.

TIGHT TURNS THROW THREE MACHINES A CURVE

Bandsaws excel at cutting curved workpieces, such as circles and the block letter "S" at left in the photo. Equipped with a ¼" blade, most of the machines easily sawed radii smaller than ⅝".

The Verdict: Ridgid strikes out because its vibration makes it difficult to use accurately. (Ridgid will replace this saw with a new model in late 2008, but we could not get one in time for this test.) We also eliminated Steelex from contention. The Craftsman saw gets a warning.

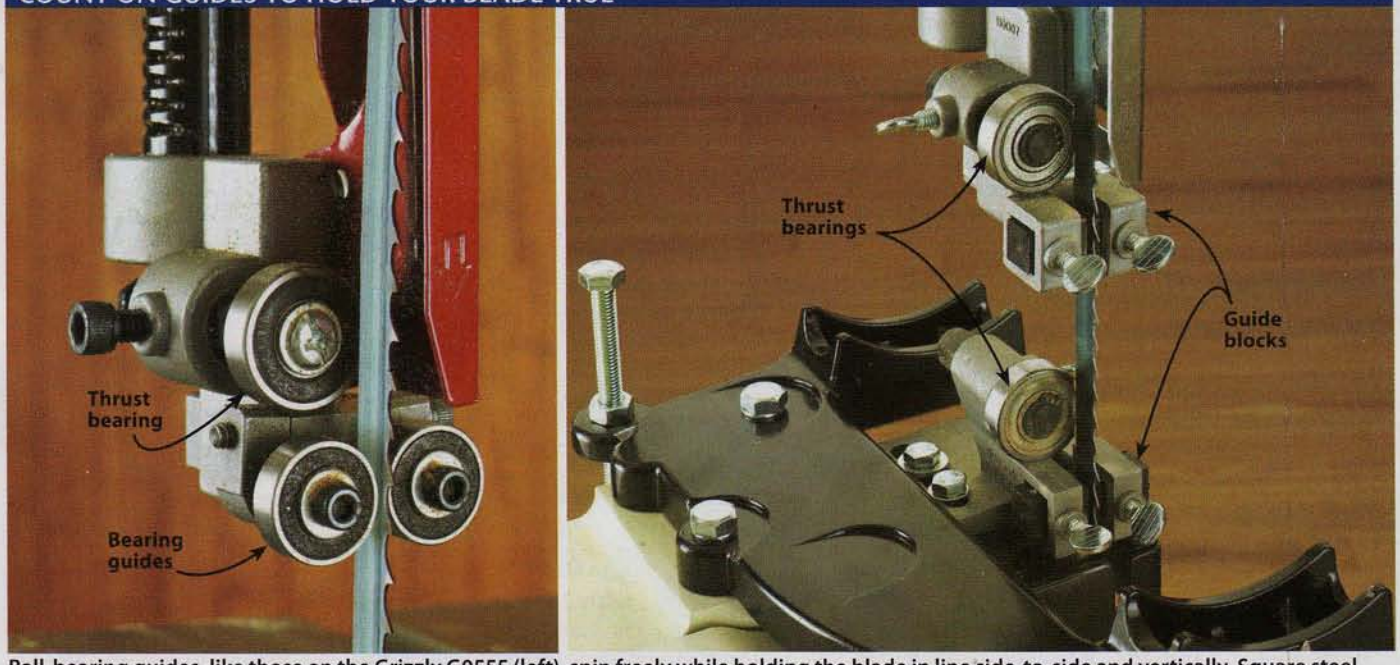
Frequent adjustments should be easy to make

■ **Upper and lower blade guides**, whether ball bearings or steel blocks, keep the blade from twisting during a cut. The thrust bearings keep the blade from deflecting backward as you feed stock. On most saws, the blade rubs against the face (or side) of the thrust bearings, as shown *below*, but Craftsman and Rikon turn their thrust bearings 90° so the blade rubs against its edge. In our testing, we could find no distinct advantage to any of these types of guides other than with speed of blade changes. Guide blocks that tighten with thumbscrews prove quicker to set than guides with setscrews that require a hex wrench.

■ **Microadjusters** on the Craftsman, Grizzly G0555, and Shop Fox make it easier to fine-tune among saws with bearing guides. By contrast, to move the lower guide blocks forward or backward on the Grizzly G0580 and Jet, you must remove the table to access the bolts.

■ **Quick-release blade tensioners** found on the Grizzly G0555 and Shop Fox, shown *opposite top*, speed blade changes and make it a snap to relieve

COUNT ON GUIDES TO HOLD YOUR BLADE TRUE



Ball-bearing guides, like those on the Grizzly G0555 (left), spin freely while holding the blade in line side-to-side and vertically. Square steel guide blocks, like the ones on the Jet JWBS-14OS (right), sit within a few thousandths of an inch from the blade.

tension on the wheels between work sessions. You still have to turn the tension knob a few times to completely remove the blade, but the process is faster and easier than tediously turning the knob dozens of times.

When we tensioned the blades by hand, we found the scales on all but the Shop Fox and Steelex reliable. You can probably trust the scales alone and get along fine for most tasks, but it's a good idea to learn to set the tension by hand. (Get a free downloadable PDF or watch a free video that shows you how at woodmagazine.com/bandsaw.)

■ **Tilting the table** proved easy on all but two saws because table trunnions in front and in back of the blade better balance the table's weight. Craftsman and Rikon—which have the largest, heaviest tables in the test—use a single, wide trunnion to the rear of the blade. When you release the lock, the cantilevered table drops forward in addition to being loose side-to-side, making it harder to tilt.

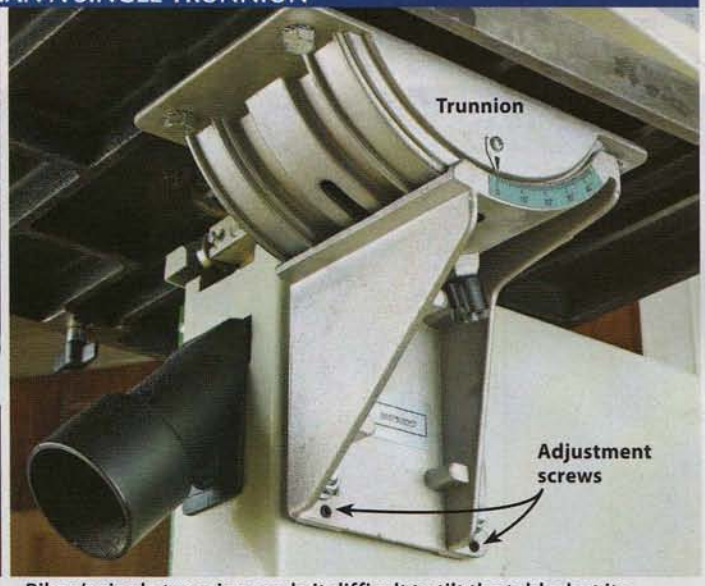
The Verdict: We vote out the Craftsman and Grizzly G0580 and put Jet on probation for troublesome lower-blade-guide adjustments.

TURN OFF THE TENSION

Turning the quick-release lever on the Shop Fox W1706 moves the top wheel up or down to instantly apply or release blade tension.

DUAL TRUNNIONS MAKE TILTING THE TABLE EASIER THAN A SINGLE TRUNNION

With front and back trunnions, like those on the Grizzly G0555, the table can only tilt within the trunnion slots.



Rikon's single trunnion made it difficult to tilt the table, but its adjustment screws made it easy to square the table front to back.

If you still can't decide, consider these factors

Okay, we're down to four saws: Grizzly's G0555, Jet, Rikon, and Shop Fox. They each have strengths and weaknesses, so let's look for more to tip the scales in favor of the best model.

■ **Rip fences and miter gauges.** The Grizzly and Shop Fox models include a rip fence, and we like the G0555's fence best because it has a cam lock, large viewfinder, and scale marked in both inches and metric equivalents. Those same models include a miter gauge; that on the Shop Fox is a notch above the others because it has the longest bar, tallest face, and three adjustable stops. If you want to buy a fence or simply upgrade your current one, read about three aftermarket fences we recommend in Wise Buys on *page 26*.

■ **Dual speeds.** Grizzly, Rikon, and Shop Fox feature dual-speed pulleys and wheels. We cut wood at both speeds, and found the faster speed not only was quicker at cutting but also produced better cut quality. Should you ever want to cut steel at the slower speed, though, a steel-cutting blade is a must.

■ **Initial assembly.** Shop Fox's one-piece cast-iron base needs no assembly, and its instructions are the best of the group, making it the quickest and easiest to put together. The Rikon also has a closed base, giving both models handy storage. Only the Grizzly and Shop Fox have leveling feet; you'll have to shim the others to get them level.

■ **Squaring the tables** to the back of the blade—critical for tasks such as bandsawing tenons or dovetails—required adding brass shims on all saws but the Craftsman and Rikon, which conveniently have built-in adjustment screws, as shown *above*.

The Verdict: Although the Jet and Rikon saws don't come with a fence or miter gauge, we don't vote out any saw.

Why spend more when these four test survivors get the job done?

Grizzly G0555, $395

High Points

- Demonstrated the least amount of blade deflection, about 1/32".
- Blade-tension quick-release lever makes blade changes quicker and could extend the life of your blades and tires.
- Comes with a miter gauge, and its sturdy rip fence with easy-to-use scale was the best in this test.
- Microadjustable ball-bearing blade guides help it cut tight curves.
- Table tilts 51° right and 16° left, enabling you to cut high-angled dovetails.

Low Points

- Its 6' power cord is shortest in the test.

More Points

- Bearing-style blade guides with micro-adjusters work well but take longer to adjust.
- Not the most powerful saw in the test, but cuts accurately and has nice features for its price.

Jet JWBS-140S, $460

High Points

- Cuts tight curves and follows marked lines well.
- Steel guide blocks with thumbscrews make adjustments quicker than using bearings.
- Table tilts 50° right and 17° left, enabling you to cut high-angled dovetails.

Low Points

- You must remove the table to adjust the lower blade guides forward or backward.
- Moving the top guide assembly up or down changes the thrust bearing and guide block alignment to the blade.
- Its 6' power cord is shortest in the test.

14" BANDSAWS PRICED $550 AND UNDER

MANUFACTURER	MODEL	BLADE			Wheel Material (1)	TABLE		BLADE GUIDES		Blade Tensioning System (3)	CUT CAPACITIES, INCHES			Dust Port Diameter, Inches	Overall Dimensions (WxDxH), Inches
		Length, Inches	Width (Min., Max.), Inches	Blade Speeds, Feet Per Minute		Dimensions (Width x Depth), Inches	Tilt Range (Right/Left), Degrees	Style (2)	Microadjusters? (Yes,No)		Resaw	Resaw with riser block	Rip/Crosscut		
CRAFTSMAN	22401	99¾	⅛,¾	1,620 / 3,340	C	20 7/16 x 15¾	50/2	B	Y	R	8 3/16	NA	13 9/16	4 & 2½	31 9/16 x 23 7/8 x 70¾
GRIZZLY	G0580	93½	⅛,¾	3,000	A	13 15/16 x 14⅛	50/16	S	N	R	6	12	13½	4	27¼ x 26 13/16 x 67 7/16
	G0555	93½	⅛,¾	1,500 / 3,200	A	13⅞ x 14⅛	51/16	B	Y	Q	6⅛	12⅛	13½	4	27½ x 28⅝ x 67
JET	JWBS-140S	93½	⅛,¾	3,000	A	13 15/16 x 14⅛	50/17	S	N	R	6	12	13½	4	26 5/16 x 22⅝ x 68¼
RIDGID	BS1400	93½	⅛,¾	2,700	A	14 x 14	47/16	S	Y	R	6	12	13⅜	2½	32¼ x 17⅜ x 67 13/16
RIKON	10-320	93½	⅛,¾	1,445 / 2,950	A	20 7/16 x 15¾	45/3	B	N	R	6	NA	13⅝	4 & 2½	31 3/16 x 20¾ x 68½
SHOP FOX	W1706	93½	⅛,¾	1,500 / 3,200	C	14⅛ x 14 1/16	50/15	B	Y	Q	6 5/16	12 5/16	13½	4	26 13/16 x 29 x 69⅛
STEELEX	ST1000	93½	⅛,¾	3,000	A	13 15/16 x 14⅛	52/18	S	N	R	6⅛	12⅛	13⅜	4	26 15/16 x 25⅝ x 67 9/16

1. (A) Aluminum
   (C) Cast Iron
2. (B) Ball bearing
   (S) Square steel insert blocks
3. (Q) Threaded rod with quick release
   (R) Threaded rod
4. A Excellent
   B Good
   C Fair
   NA Not Applicable
5. Timed cuts while resawing 6"-wide red oak
6. Resawing 6"-wide red oak
7. Using a 1-hp dust collector with 4" hose
8. (B) Blade
   (F) Rip fence
   (L) Task light
   (M) Miter gauge
   (R) Riser block
   (T) Tools for adjustments
9. (C) China
   (T) Taiwan
10. Prices current at time of article production and do not include shipping, where applicable.

Rikon 10-320, $500

High Points

- Demonstrated the least amount of blade deflection, about 1/32".
- Showed the least amount of vibration in the test.
- Its table is the largest in the test.
- Hex wrenches needed for adjustments store in a tool holder on the back of the saw.
- Reference chart inside lower door provides helpful tips without you having to open the owner's manual.

Low Points

- Table tilts 45° right and 3° left, least in the test.
- Single table trunnion makes adjustments more difficult than models with two trunnions.

More Points

- Its steel frame won't accept a riser block.
- Its table has two miter slots, but no miter gauge is included.
- Bearing-style blade guides work well but take longer to adjust.

Shop Fox W1706, $540

High Points

- Demonstrated the most power, cutting twice as fast as half the saws in our resaw test.
- Cuts tight curves and follows marked lines well.
- Cast-iron wheels and base contribute to lowest amount of vibration in the test.
- Rack-and-pinion adjustment for bearing guide post makes for smooth adjustments without the post dropping upon release.
- Blade-tension quick-release lever speeds blade changes and could extend the life of your blades and tires.
- Table tilts 50° right and 15° left, enabling you to cut high-angled dovetails.
- Has the beefiest miter gauge in the test.

Low Points

- Showed the second-highest amount of blade deflection in our resaw test.

More Points

- Its 10½' power cord was longest in the test.
- Bearing-style blade guides with microadjusters work but take longer to adjust.

PERFORMANCE RATINGS (4)														ACCESSORIES (8)							FOR MORE INFORMATION	
PRIMARY								SECONDARY														
Power (5)	Curve-Cutting Ability	Blade Deflection (6)	Ease of Changing Blades	Ease of Tensioning Blade	Blade Guide Effectiveness	Ease of Adjusting Blade Guides	Absence of Vibration	Ease of Aligning Wheels	Ease of Setting Table Bevel Angle	Dust Collection Effectiveness (7)	Absence of Blade Drift	Rip Fence Quality	Miter Gauge Quality	Cabinet/Doors/Latches Quality	Ease of Assembly	Standard	Optional	Weight, lbs.	Power Cord Length, Feet	Warranty, Years	Country of Assembly (9)	Selling Price (10)	Phone Number	Web Site
B	B-	B+	C	B-	B-	B	A	a	b-	b	c	b-	NA	a	b-	B,F,L		228	7	1	C	$550	800-383-4814	craftsman.com
A-	B	C	A-	C	B+	B-	B	b	a-	b-	b-	b	b	a	b	B,F,M	R	162	6	1	T	$325	800-523-4777	grizzly.com
B+	A-	A	B	B	A	B	B-	a	a-	b	b+	b+	b	a	b+	B,F,M	R	168	6	1	T	$395		
B	A	B+	A	C	A	B-	B+	a	a-	b-	c	NA	NA	a	b-	B	F,M,R	149	6	5	T	$460	800-274-6848	jettools.com
A-	C	A	B-	C	B	A	C	a	a-	c	a	NA	NA	a	b	B,T	F,M,R	176	10	3	C	$350	866-539-1710	ridgid.com
B	B+	A	C+	C	B-	B	A	a	b-	b	b	NA	NA	a	b-	B,T	F,M	189	7	2	C	$500	877-884-5167	rikontools.com
A	A	C+	B	B+	A	B	A	a	a-	b	c+	b	a	a	a	B,F,M,T	R	241	10½	2	T	$540	800-840-8420	shopfox.biz
A-	B-	B-	A	C	B	B+	B	b	a-	b	c-	b	b	a	b	F,M,T	R	156	6½	2	T	$325	800-840-8420	woodstockint.com

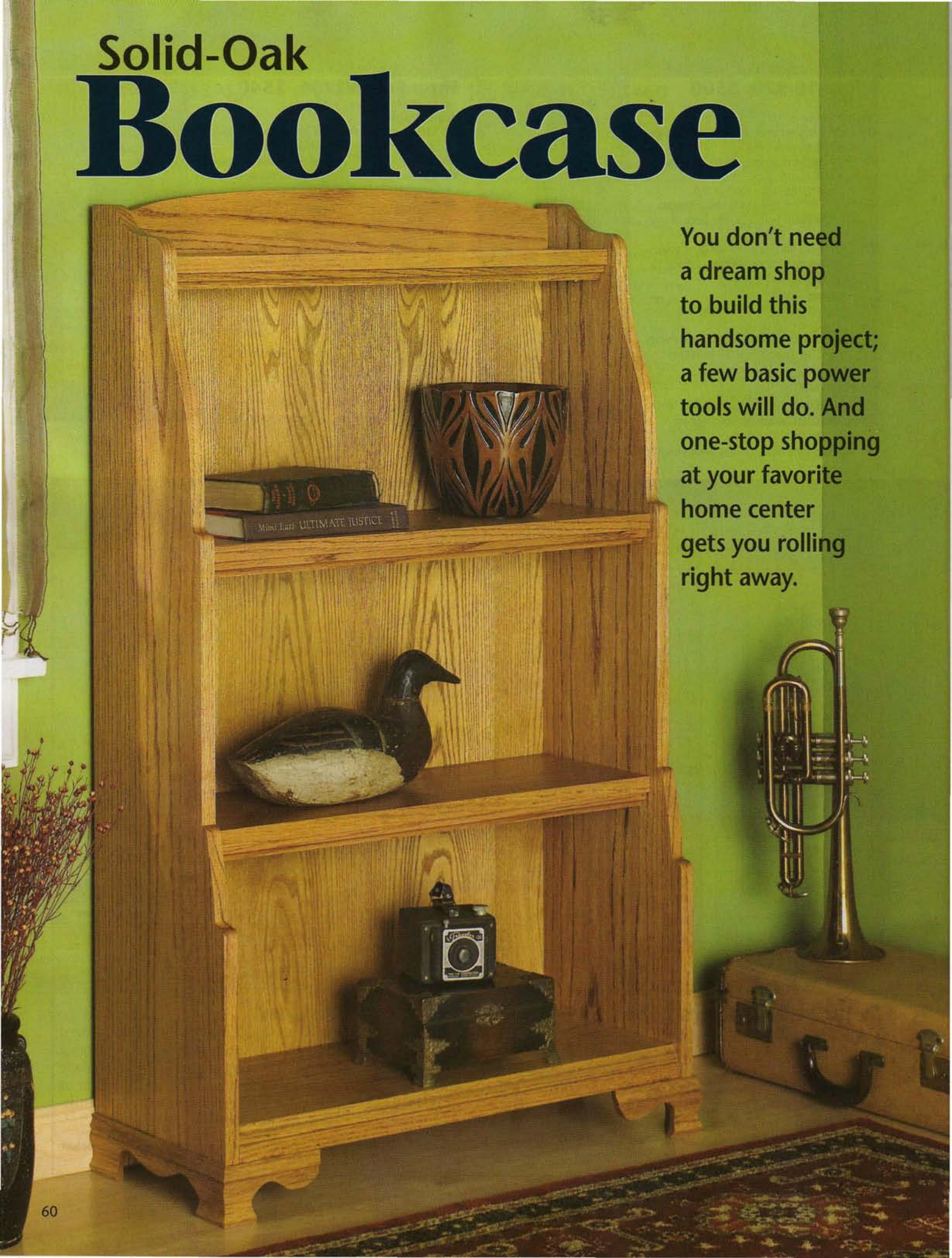
Band your dollars together and put them into this saw

The Grizzly G0555 and Shop Fox W1706 separate themselves from the field, not for doing one thing well but rather for doing the *most* things well. The Shop Fox demonstrates the most power, cuts curved shapes best, vibrates little, and has heavy-duty cast-iron components. But we just can't get past its blade deflection of 3/32" in a 6" resaw cut. If this doesn't bother you then buy this saw. But we'll gladly trade cutting speed for accuracy, so we've named the G0555 our Top Tool.

It wasn't the most powerful saw, but its quality of cut proved second to none, and that's ultimately what we expect from a bandsaw. It also excelled at cutting curves because its blade guides held the blade true without twisting, and it was at or near the top in every performance category with no significant flaws. And it's also the best value in the class.

Written by **Bob Hunter** with **Craig Ruegsegger** Illustrations: **Tim Cahill**

Solid-Oak Bookcase



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PROJECT HIGHLIGHTS

- Overall dimensions: 27¾" wide × 11⅛" deep × 45⅞" high.
- Power tools needed: tablesaw, router, jigsaw, sander, and drill.

Skill Builders

- Learn a simple clamping method that ensures flat edge-glued panels.
- Discover an easy way to make ogee bracket feet from stock crown molding.

See a slide show of this project coming together at woodmagazine.com/slides

You'd pay a lot for a solid-wood bookcase in a furniture store. Instead, save a bundle by building this handsome oak piece. You'll get the bonus of enjoying some time in your shop.

Edge-glue the blanks

1 To make blanks for the sides (A), cut four ¾×3½×43" boards and two that measure ¾×2½×43". Lay out two 3½"-wide boards and one 2½"-wide board for each side, arranging them for the best grain and color match. Edge-glue the sides. To obtain the flattest panels, see the **Shop Tip** *below*.

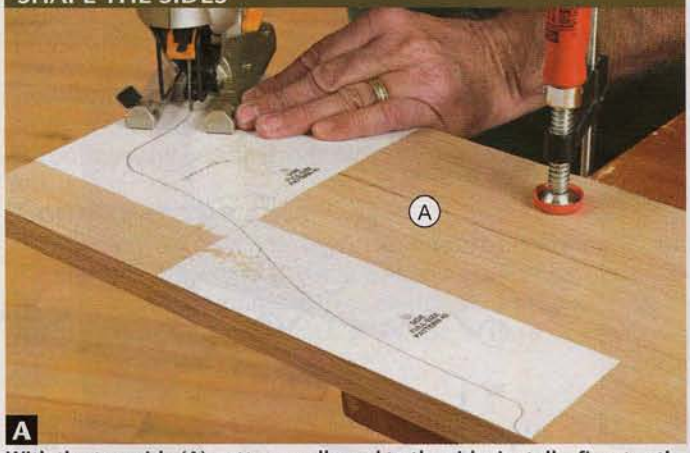
2 For the top shelf (C) blank, edge-glue two ¾×3½×27" boards, and for each middle shelf (D) blank, edge-glue two ¾×3½×27" boards and one ¾×2½×27" board. You'll later rip one cove (F) from the edge of each of these shelf blanks. For the bottom shelf (E) blank, edge-glue three ¾×3½×27" boards.

Machine the case parts

1 Cut the sides (A) and bolsters (B) to size [**Materials List**, *page 64*]. Make two photocopies of **Side Pattern #1**, **Side Pattern #2**, and the **Bolster Pattern** on the *WOOD Patterns®* insert. Adhere the patterns to the parts with spray adhesive [**Drawing 1**], and cut them to shape [**Photo A**]. Sand the cut edges smooth. To drum-sand the edges using an electric drill, see *page 20*. Edge-glue the bolsters (B) to the sides (A) [**Drawing 1**].

2 Mark the ends of the stopped rabbets along the inside rear edges of the sides (A) for the back (K) [**Drawing 1**], making sure you have mirror-image sides. Chuck a ¼" rabbet bit into a

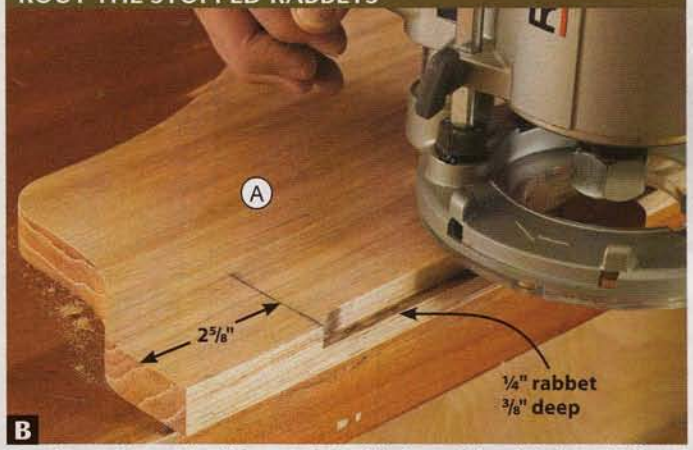
SHAPE THE SIDES



A

With the two side (A) patterns adhered to the side, install a fine-tooth blade into your jigsaw and carefully cut along the line.

ROUT THE STOPPED RABBETS



B

Starting at the marked line on the inside face of the right-hand side (A), rout a rabbet all the way to the bottom.

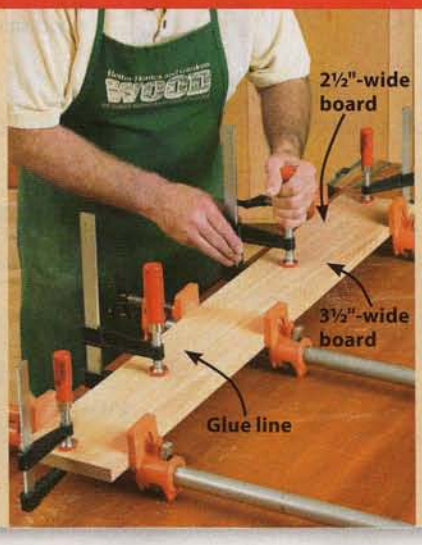
SHOP TIP

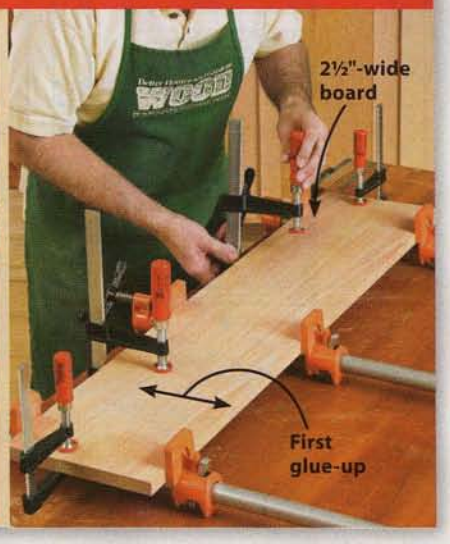
How to edge-glue finished-thickness boards

Buying boards already planed to ¾" thick saves time and eliminates the need for a planer. But when edge-gluing narrow boards to make a wide panel, there's no extra thickness to plane or sand away, so the surfaces of adjacent boards must align perfectly. Using the sides (A) as an example, here's how to ensure the flattest glue-ups.

Glue and clamp the first two boards, applying light pressure with pipe or bar clamps. Then apply clamps along the glue line to align the board faces, as shown *near right*. Tighten the pipe clamps.

After the first glue-up dries, glue and clamp the third board to the first two, once again clamping along the glue line, as shown *far right*.





handheld router and adjust it to cut ⅜" deep. Rout the rabbet into the right-hand side [**Photo B**]. Then repeat on the left-hand side starting at the bottom and routing to the line. Finish-sand the sides.

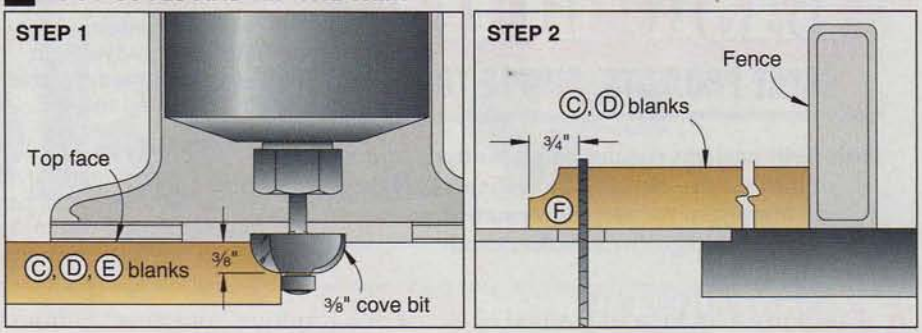
3 Retrieve the shelf blanks, and cut the top shelf (C), middle shelves (D), and bottom shelf (E) to length. From a ¾×3½" board, cut the crest rail (G) and bottom rail (H) blanks to length. Rip the bottom rail to width.

4 Chuck a ⅜" cove bit into a handheld router, and rout the top front edge of the top shelf (C), middle shelf (D), and bottom shelf (E) blanks [**Drawing 2, Step 1**]. Then rip the cove trim (F) from the top and middle shelf blanks [**Step 2**]. Rip the shelves to width. Switch to a ¼" rabbet bit and rout a ⅜"-deep rabbet along the bottom rear edge of the top shelf [**Drawing 3**].

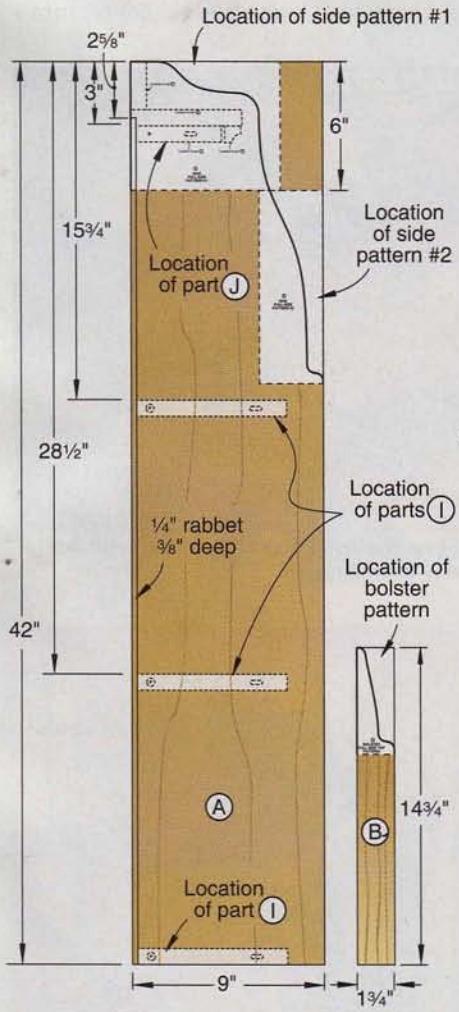
5 Make two photocopies of the **Crest Rail Pattern**. Cut along the pattern lines, and adhere the patterns to the crest rail blank, flipping one pattern. Jigsaw and sand the rail to shape.

6 Finish-sand the top shelf (C), middle shelves (D), bottom shelf (E), cove trim (F), crest rail (G), and bottom rail (H).

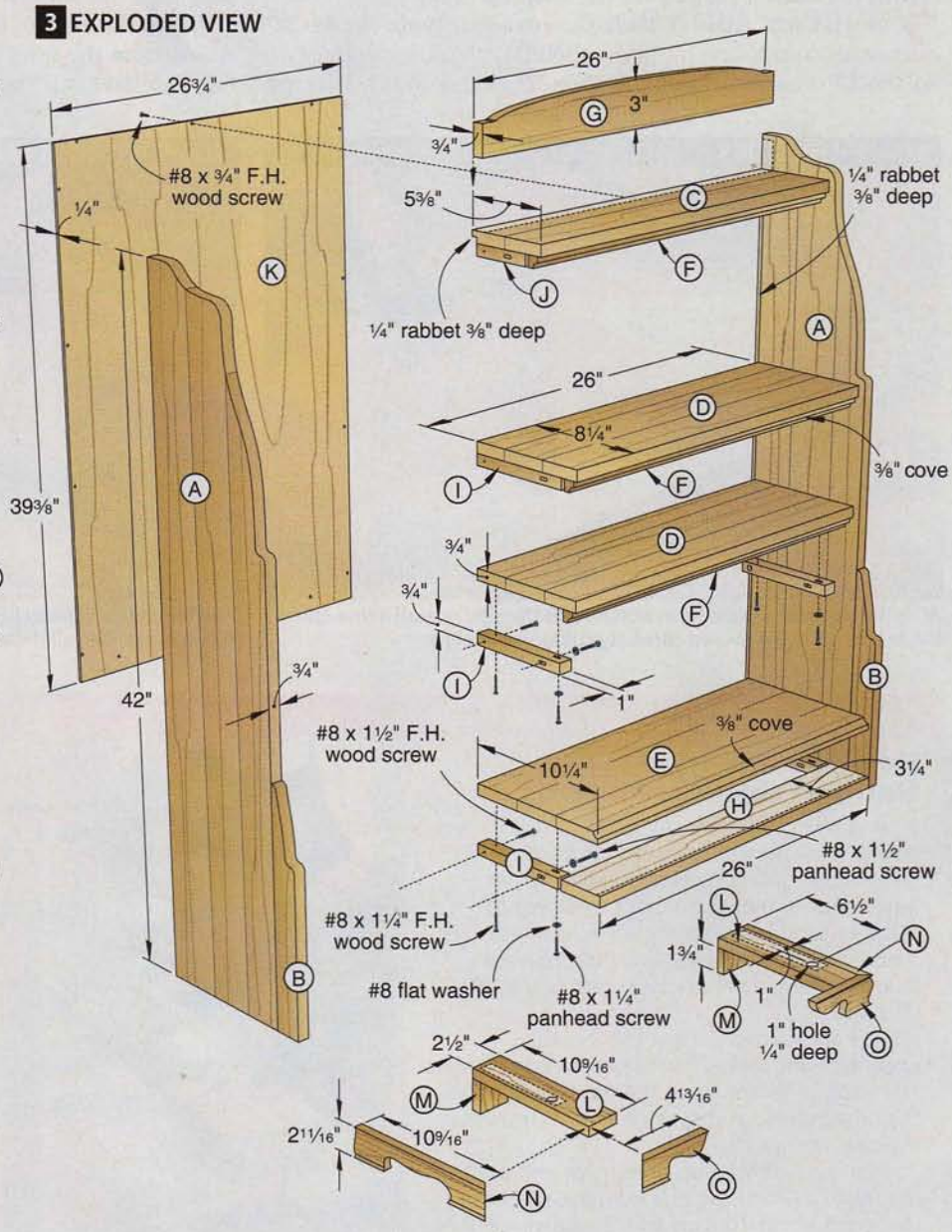
2 ROUT COVES AND RIP THE TRIM

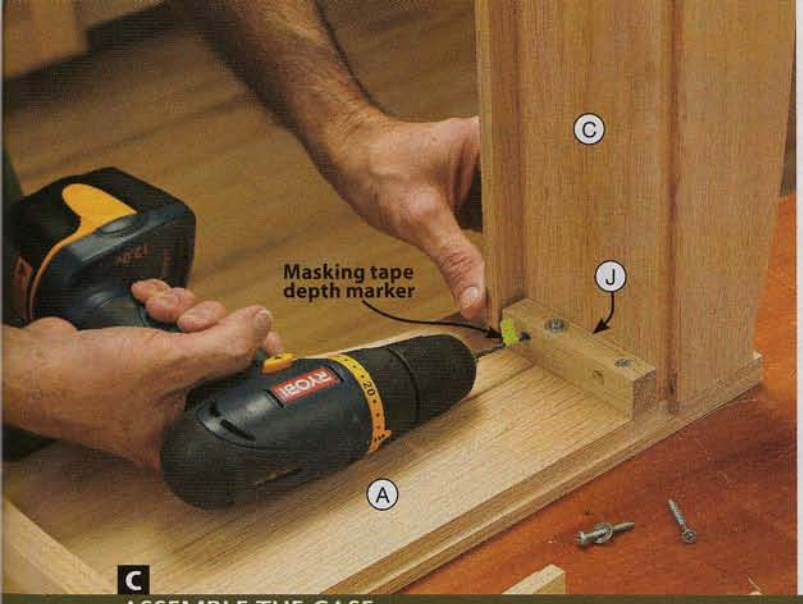


1 SIDE



3 EXPLODED VIEW





C

D

ASSEMBLE THE CASE

Using the shank hole and center of the slot in the short cleat (J) as guides, drill pilot holes into the bottom of the top shelf (C).

With the second side assembly (A/I/J) on the workbench, drill pilot holes, and glue and screw the shelves (C, D, E) to the cleats (I, J).

Glue and clamp the cove trim to the top and middle shelves [**Drawings 3** and **3a**] and the crest rail to the top shelf [**Drawing 3b**]. Keep the part ends flush.

7 Cut the long cleats (I) and short cleats (J) to size. Drill countersunk shank holes and form slots by drilling overlapping holes [**Drawing 4**]. (For the #8 wood screws in this project, drill 5/32" shank holes and 7/64" pilot holes.) Make sure you have four left-hand and four right-hand cleats. (The countersunk hole and slot in the 1" width are offset toward the front of the bookcase, and the shank hole in the ¾" thickness is countersunk on the inside face.) Finish-sand the cleats.

Construct the case

1 Position the cleats (I, J) on the sides (A) [**Drawing 1**], and clamp them in place. Using the hole and center of the slot in each cleat as a guide, drill pilot holes into the sides. Sparingly apply glue to the back 2" of the ¾" face of each cleat [**Drawing 4**], and screw them to the sides with flathead screws and panhead screws and washers [**Drawing 3**].

2 Place one side assembly (A/I/J) inside face up on your workbench. Sparingly apply glue to the back 2" of the top face of the short cleat (J). Position the top shelf assembly (C/F/G) against the short cleat, aligning the back of the assembly with the back edge of the side (A). Drill pilot holes [**Photo C**], and fasten the shelf with a flathead screw and panhead screw and washer [**Drawing 3**]. Then glue and screw the middle shelf assemblies (D/F) and bottom shelf (E) to the long cleats (I). Now glue and screw the shelves to the cleats on the second side assembly [**Photo D**].

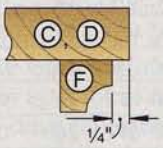
3 Glue and clamp the bottom rail (H) to the underside of the bottom shelf (E) with the front edge of the rail and the front edges of the bolsters (B) flush [**Drawing 3**].

4 Cut the back (K) to size and finish-sand it. The oak side faces up when cutting the plywood on a tablesaw.

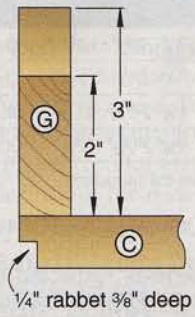
Make ogee bracket feet

1 Cut the bracket cleats (L) and braces (M) to size. Drill a 1" hole ¼" deep in the top face of each bracket cleat to accommodate the heads of the panhead screws that fasten the bottom shelf (E) to the long cleats (I) [**Drawings 3** and **3c**].

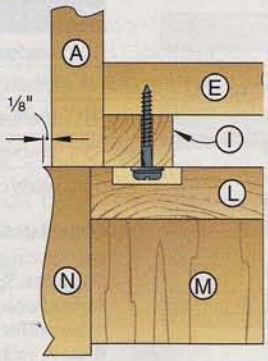
3a COVE TRIM DETAIL



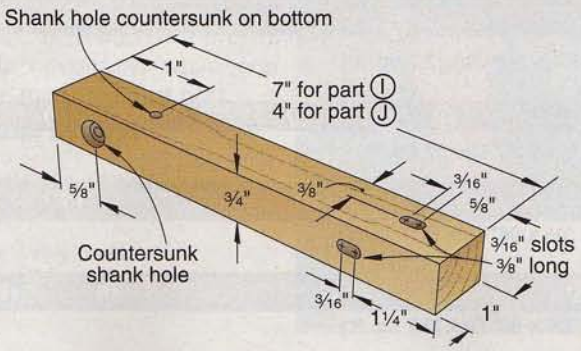
3b CREST RAIL DETAIL



3c BRACKET FOOT DETAIL



4 CLEATS
(Right-hand cleat shown)



BASIC-BUILT
GREAT PROJECTS. SIMPLE TOOLS.

2 To make ogee bracket feet from stock crown molding purchased at a lumberyard or home center, see *page 22*.

Note: *We used 9/16×3¼" crown molding for our ogee bracket feet. The article on* page 22 *shows how to make bracket feet with this as well as other sizes of crown molding.*

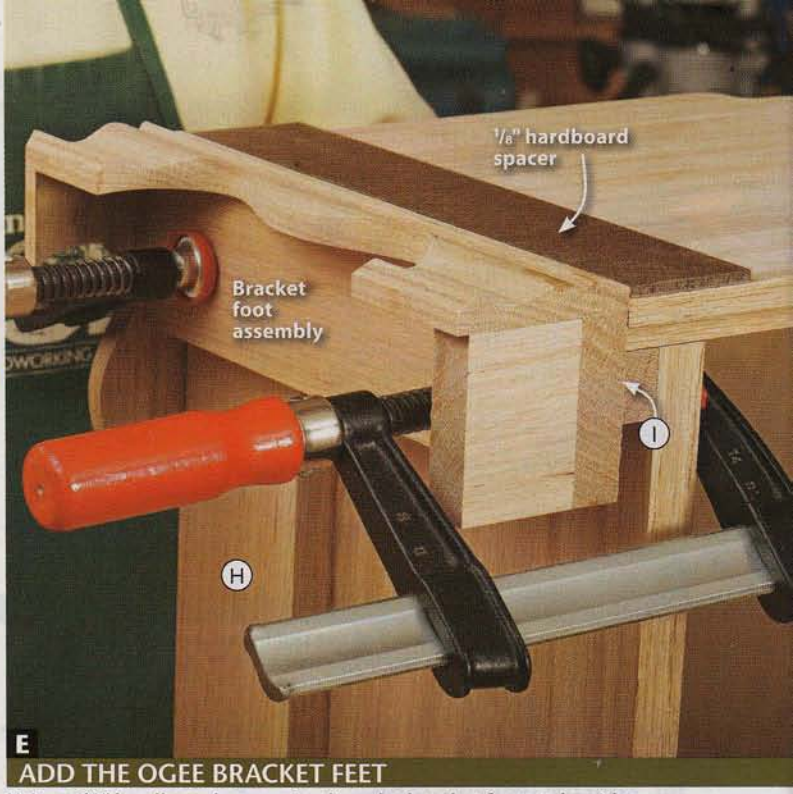
3 With the bracket feet complete, glue them to the bottom of the case [**Drawing 3c** and **Photo E**].

Apply the finish

1 Inspect all the parts and finish-sand where needed. Apply stain, if desired, and a clear finish. (We applied Varathane Golden Oak no. 227 stain and two coats of satin polyurethane, lightly sanding with 220-grit sandpaper between coats.)

2 Clamp the back (K) to the case, drill countersunk screw holes, and drive the screws [**Drawing 3**].

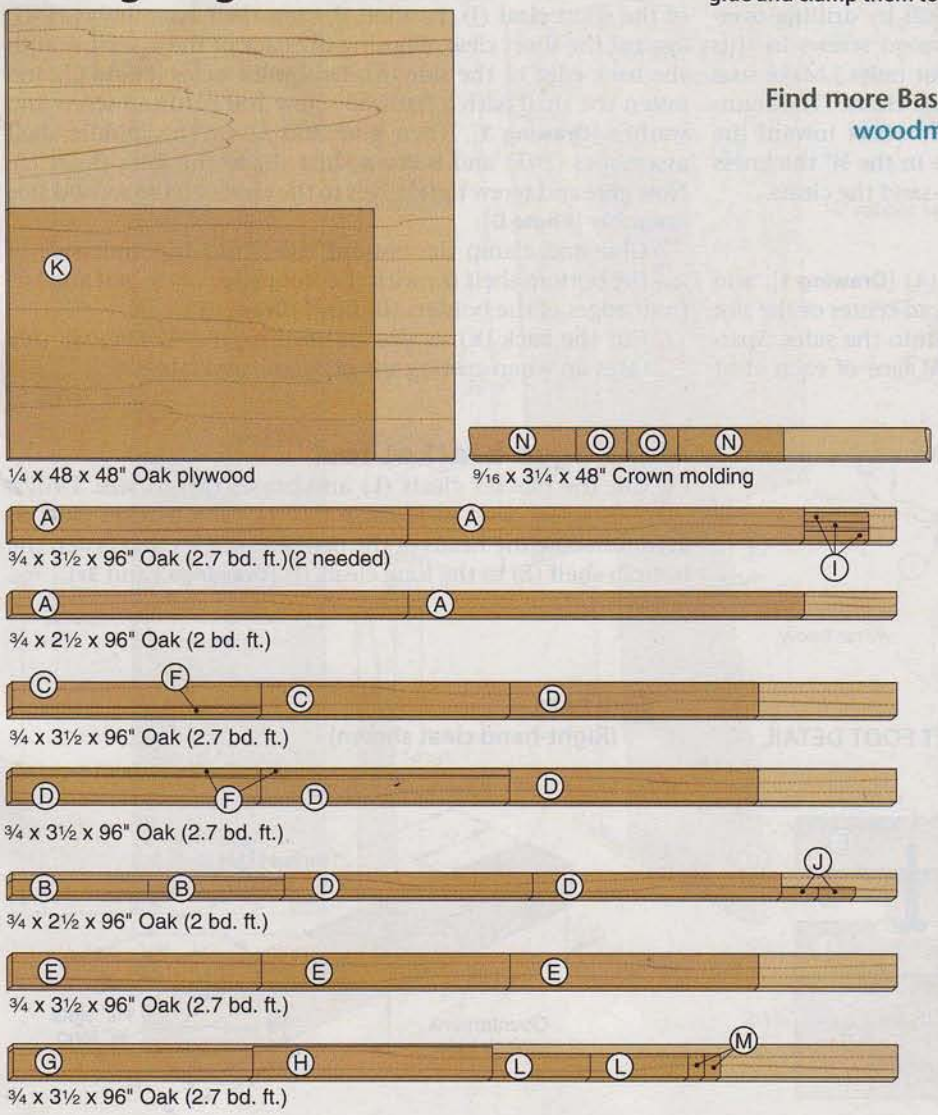
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**



E
ADD THE OGEE BRACKET FEET

Using a 1/8" hardboard spacer to align the bracket feet at the sides, glue and clamp them to the bottom rail (H) and long cleats (I).

Cutting Diagram


K
¼ x 48 x 48" Oak plywood
N O O N
9/16 x 3¼ x 48" Crown molding
A A I
¾ x 3½ x 96" Oak (2.7 bd. ft.)(2 needed)
A A
¾ x 2½ x 96" Oak (2 bd. ft.)
C F C D
¾ x 3½ x 96" Oak (2.7 bd. ft.)
D F D D
¾ x 3½ x 96" Oak (2.7 bd. ft.)
B B D D J
¾ x 2½ x 96" Oak (2 bd. ft.)
E E E
¾ x 3½ x 96" Oak (2.7 bd. ft.)
G H L L M
¾ x 3½ x 96" Oak (2.7 bd. ft.)

Find more Basic-Built project plans for sale at
woodmagazine.com/basicbuilt

Materials List

		FINISHED SIZE T	W	L	Matl.	Qty.
Case						
A*	sides	¾"	9"	42"	O	2
B	bolsters	¾"	1¾"	14¾"	O	2
C*	top shelf	¾"	5⅜"	26"	O	1
D*	middle shelves	¾"	8¼"	26"	O	2
E*	bottom shelf	¾"	10¼"	26"	O	1
F*	cove trim	¾"	¾"	26"	O	3
G*	crest rail	¾"	3"	26"	O	1
H*	bottom rail	¾"	3¼"	26"	O	1
I	long cleats	¾"	1"	7"	O	6
J	short cleats	¾"	1"	4"	O	2
K	back	¼"	26¾"	39⅜"	OP	1
Feet						
L	bracket cleats	¾"	2½"	10 9/16"	O	2
M	braces	¾"	2½"	1¾"	O	2
N*	bracket sides	9/16"	2 11/16"	11⅛"	OC	2
O*	bracket fronts	9/16"	2 11/16"	5⅜"	OC	2

*Parts initially cut oversize. See the instructions.

Materials key: O–oak, OP–oak plywood, OC–9/16×3¼" oak crown molding.
Supplies: Spray adhesive; #8×¾", #8×1¼", and #8×1½" flathead wood screws; #8×1¼" and #8×1½" panhead screws; #8 flat washers.
Bits: ¼" rabbet and ⅜" cove router bits.

11 Ways to Get Dust (Before it Gets You)

Unless you're having a square dance, you don't want sawdust on the floor. And you certainly don't want to breathe it. We recently tried dozens of products that promise better dust pickup. Here are the ones that work best.

Gobble up hard-to-tame messes

Catch a broad blast of debris...

While no single accessory will catch all the dust and chips that go airborne when turning wood, the Big Gulp Ultimate Dust Hood, shown *above*, gobbles up a lot of it. When tethered to a 1-hp or larger dust collector with 4" hose, the Big Gulp gathers in most of the chips made when hollowing out a bowl or vessel. It's especially effective at sucking up sanding dust from turnings—the stuff you'd breathe into your lungs otherwise.

The Big Gulp mounts between the ways of any lathe bed on three slotted arms with locking knobs, allowing you to position the hood where you need help most. You can also get it on a floor stand (model #DBU30, $120) or the long-armed Dust Picker (model #DPICKER2, $60), which has a smaller hood, for dust collection behind a miter-saw, radial-arm saw, or other dust-spewing tool.

Big Gulp Ultimate Dust Hood
Model #DLGULP, $60
Penn State Industries
800-377-7297, pennstateind.com

...or pinpoint the suction where you need it

When you've got to have dust collection in hard-to-reach areas or places where a 4" hose gets in the way, attach a Loc-Line articulated hose to your shop vacuum (or with a reducer to a larger dust-collection system). Bend Loc-Line to almost any configuration, and snap on a nozzle to place the suction right where you need it. Use couplers to join multiple lengths of hose. We like Loc-Line for use with any stationary sander, as well as drill presses and router-table operations when you can't use a fence-mounted dust port.

Loc-Line Modular System
2½"×23" hose, $26
Adapters and nozzles, $4–$6 each
Lockwood Products, 800-423-1625

Where to buy: Lee Valley Tools, 800-871-8158, leevalley.com; Grizzly Industrial, 800-523-4777, grizzly.com

Add punch and simplicity to your DC system

Gain airflow and filtration with specially made bags

If your dust collector's filter bag puffs up like a taut balloon, you're probably not getting maximum airflow through your collector. Although many manufacturers offer high-efficiency filter bags (1 to 5 microns) as standard or optional equipment, most don't do anything to optimize airflow. American Fabric Filter custom-makes oversize 1-micron bags that increase airflow by not restricting it. Top bags cost from $120 to $150, and bottom bags from $70 to $85.

High-Efficiency Filter Bags
Custom-made, $70–$150
American Fabric Filter
800-367-3591, americanfabricfilter.com

No-clog blast gates improve airflow

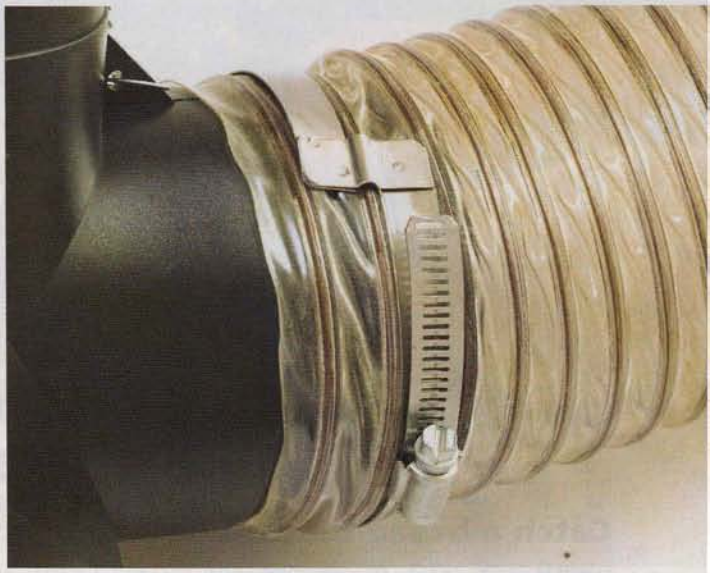
Debris can build up in the grooves of typical blast gates, preventing them from closing fully, so they leak air and ultimately reduce suction where you need it. Lee Valley's self-cleaning gates extend through the bracket to push debris out of the groove and prevent such buildup.

Self-Cleaning Blast Gates
2"–6" models, $8–$17 each
Lee Valley Tools
800-871-8158, leevalley.com

Better seal eliminates air leaks

Flexible dust-collection hose has a metal supporting wire that spirals throughout it to prevent the hose from collapsing under suction. But with ordinary hose clamps, leaks can occur where the clamp crosses that wire. Lee Valley's Bridge Hose Clamps straddle the metal wire, as shown, which allows the clamp to fully seal the hose to the connector or dust port.

Bridge Hose Clamps
2½"–6" models, $4.90–$6.60
Lee Valley Tools
800-871-8158, leevalley.com



Quick changes mean fewer hoses

Here's an accessory for those of us who don't have the luxury of a central dust-collection system and have to move the collector from tool to tool. Fazlok Quick Disconnect male and female fittings allow you to make changes quickly and without tools. You simply twist and turn to lock and unlock the hose from the tool. Install female Fazlok fittings on your collector's inlet and on the dust ports on your tools; then clamp male fittings onto both ends of your flex-hose. To maximize airflow, you can have several hoses of different lengths, and use the shortest hose you need to get from the collector to the tool.

Fazlok Quick Disconnect Hose Fittings
2½" & 4" models, $8–$11 each; kits $26–$30
Woodworker's Supply
800-645-9292, woodworker.com

Make your shop vacuum work more effectively

No-hassle, supple-but-stout hose proves effective for use with sanders

Okay, you've got a shop vacuum that you attach to your portable power sander for dust extraction, but the hose proves too bulky, too stiff, or the ribs catch on edges. Klingspor's Crush-Proof lightweight hose eliminates those worries. With an adapter on one end to fit any 2½" vacuum opening, the soft, flexible 1" hose easily attaches to many sanders. We also recommend Klingspor's universal rubber adapter (#FE92105, $3) that enables attachment to virtually any sander, even those with rectangular dust ports.

Crush-Proof Vacuum Hose
Model KA00011, $23
Klingspor's Woodworking Shop
800-228-0000, woodworkingshop.com

You can use this filter for wet messes

We've all been there: To remove the caked-on dust from the pleated paper filter of your shop vacuum, you tap it, beat on it, or blow it out with compressed air, but you still can't get it fully clean. Not so with Cleanstream filters, made of non-stick Gore-Tex material you can clean with air or water, so it works on wet and dry pickups. They deliver finer filtration than paper varieties—trapping particles as small as 0.3 micron. Filters fit Shop-Vac, Craftsman, and Ridgid brands.

Cleanstream Wet/Dry Vacuum Filters
$23–$35 each
W.L. Gore and Associates
800-758-6755, cleanstream.com

No holes necessary for dust pickup

Mirka's Abranet sanding discs are made of a porous, meshlike material, with grit on one side and hook-and-loop-style fasteners on the other. The result: You get effective dust collection through all the pores without taking the time to line it up with the sander's dust-collection holes. Abranet comes in 13 grits from 80 to 1,000, and costs nearly twice as much as Mirka's Gold sandpaper discs. But the better dust collection means the abrasive won't load up with sanding dust, so it lasts longer than typical sandpaper. And it means you'll put less dust into the air. Abranet also comes in sheets and rolls.

Abranet Sanding Discs
Various grits, $14–$18 for 10 discs (also available in 50 packs)
Mirka Abrasives
800-843-3904, mirka.com

Where to buy: Woodcraft, 800-225-1153, woodcraft.com

Master the mess of machine-cut 'tails

Dust-collection hoods for Leigh and Rockler dovetail jigs do a remarkably good job of corraling the spray of chips and dust created when router-cutting dovetails. Each fixture mounts directly onto the jig's front—including older models with the help of special mounting kits—and you simply attach your shop vacuum hose to the 2½" port. The Leigh VRS features a flat top that supports your router flush with the tops of the jig fingers. A sliding dust port glides underneath and follows the router. The Rockler fixture has soft bristles that stick up from a dust hood, allowing the router bit to pass through without harm.

Vacuum & Router Support (VRS)
12"–24" lengths, $75–$84
Leigh Industries
800-663-8932, leighjigs.com

Dovetail Jig Dust Collector
Model #22224, $42
Rockler Woodworking and Hardware
800-279-4441, rockler.com

Contractor-Grade Mobile Crane

Junior operating engineers will enjoy doing the heavy lifting with this fully operational construction toy.

Before your favorite youngster gets bogged down in video games, give a gift that lets his imagination do the lifting—this sturdy wooden crane.

Make the chassis

1 For the chassis (A), cab (G), and counterweight (H), cut a 1½×6¼×12" blank. (We used walnut.) Rip a 1½"-wide piece from one edge, and set it aside for the cab and counterweight. Cut the remaining piece to size for the chassis [**Materials List**, *page 72*].

2 Lay out the chassis (A) front and rear bevels [**Drawing 1**], and bandsaw and sand them to shape. Then chuck an 11/32" brad-point bit into your drill press, position the fence ½" from the bit center, and drill axle holes in both sides of the chassis [**Photo A**]. Finish-sand the part.

Build the mast and boom

1 For the mast sides (B) and mast spacers (C), cut two ¾×1½×26" blanks (We used maple). Cut one mast side and one spacer from each blank. Chuck a 1" Forstner bit into your drill press and drill five holes in the mast sides [**Drawing 2**, **Photo B**].

2 To assemble the mast, cut two ¾×2¼×24" cauls from scrap. (We used MDF.) Cover one side of each caul with masking tape to keep glue from sticking. Apply tape to one side of each mast (B) to mark the mast spacer (C) locations [**Drawing 2**]. (The thickness of the tape provides just enough of a lip to keep the spacers from shifting and makes it easy to remove excess glue.) Glue and clamp the mast [**Photos C** and **D**].

3 Mark the 3/16" boom pivot hole center on one mast side (B) [**Drawing 2**]. Chuck a brad-point bit into your drill press, insert a ¾"-thick scrap block between the mast sides to prevent chip-out, and drill the hole.

4 Form the mast (B/C) top bevel [**Drawing 2**, **Photo E**], and sand it smooth. Sand ⅛" round-overs on the top corners of the mast sides (B) and upper mast spacer (C). Chuck a chamfer bit into your table-mounted router, and rout 1/16" chamfers along the edges of

PROJECT HIGHLIGHTS

- Overall dimensions: 25" high ×13⅝" reach × 7¾" track ×11⅜" wheelbase.
- Hand-operated hoists raise and lower the boom and bucket.
- The tower assembly pivots smoothly on a ball-bearing lazy Susan to easily pick up and place loads.
- A wide-track chassis featuring eight sets of dual wheels provides sure-footed mobility.
- You provide the flat stock and a few wood screws. We provide a one-stop source for the remaining hardware and special fittings.

Skill Builder

- Discover how to hold rounded items steady for drilling on your drill press.

the 1" holes and the outside edges of the mast, except for the bottom. Finish-sand the mast.

5 From a ¾×1⅜×22" piece of stock, resaw and plane a ¼"-thick blank for the front spacer (D) and rear spacer (E). (We used walnut.) Cut the parts to length. Bandsaw and sand the chamfer on the front spacer and the taper on the rear spacer [**Drawing 3**].

6 From a ¾×1⅜×22½" piece of stock, resaw and plane the two boom sides (F). (We used maple.) Glue and clamp the boom spacers (D, E) between the boom sides [**Drawing 4** and **Photo F**].

7 With the glue dry, use your drill press to drill a 3/32" hole through the rear spacer (E) for the boom-operating string, a 3/16" hole for the boom pivot, and another 3/16" hole at the front end of the boom [**Drawing 4**]. When drilling the front hole, insert a ¼"-thick piece of scrap between the boom sides (F) to prevent chip-out. Then mark the two tapered cuts, and bandsaw and sand them to shape. Sand ⅛" radii on the boom ends. Now rout 1/16" chamfers along the edges. Finish-sand the boom.

Add cab and counterweight

1 Retrieve the walnut cab (G) and counterweight (H) blank. Mark the hole center near one end [**Drawing 1a**]. Chuck a 1" Forstner bit into your drill press, and drill the hole. Then bandsaw and sand the ⅜" angled corner. Crosscut the cab from the blank. Now rout 1/16" chamfers along the edges of the hole and ⅛" chamfers along the outside edges of the cab. Finish-sand the cab.

2 To position the cab (G) on the mast (B/C), first insert the boom between the mast sides (B), and slide a piece of #10-32 threaded rod through the holes in both assemblies. Then glue and clamp the cab to the mast sides (B) [**Drawing 1** and **Photo G**]. Remove the boom from the mast.

3 From the remaining walnut blank, cut the counterweight (H) to size. Rout chamfers on the edges [**Drawing 1**], and finish-sand it. Now glue and clamp the counterweight to the boom (D/E/F), ½" from the end and centered.

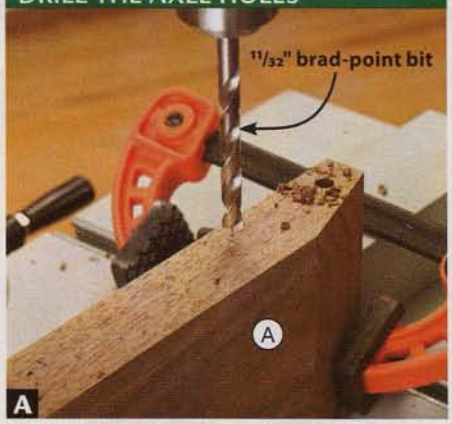
Fabricate the hoist

1 From ½"-thick stock, cut the hoist sides (I) to size. Adhere them face-to-face with double-faced tape. Mark hole centers [**Drawing 5a**], and drill the holes on your drill press with a ¼" brad-point bit. Lay out the angled corner. Bandsaw and sand it to shape. Sand round-overs on the corners at both ends of the angle. Separate and finish-sand the parts.

2 Cut the hoist base (J) to size, making sure the width equals the combined width of the mast (B/C) and the hoist sides (I). Rout a chamfer along the top front edge [**Drawing 5**]. Drill shank holes for fastening the hoist base to the mast sides (B). (For the #8 screws, drill 5/32" shank holes and 7/64" pilot holes.)

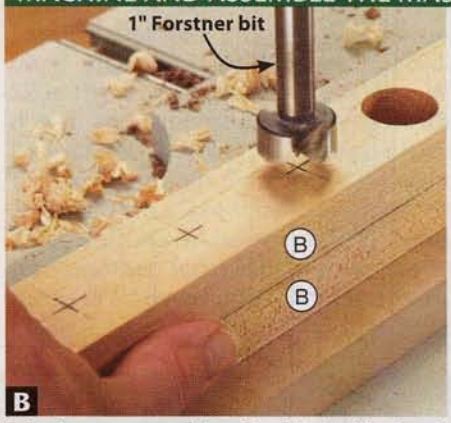
3 Clamp the hoist sides (I) to the hoist base (J) [**Drawing 5**]. Drill screw

DRILL THE AXLE HOLES

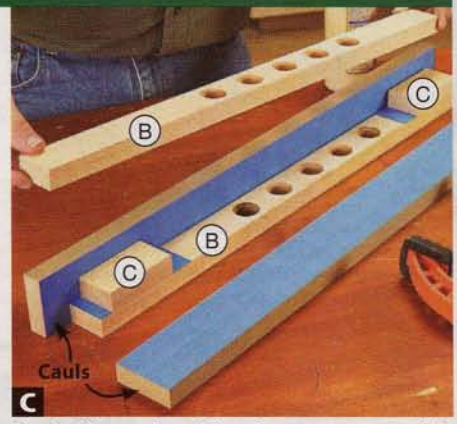


Lay out the axle hole centers on the chassis (A). Clamp the chassis to the drill-press fence at each location, and drill 1½"-deep holes.

MACHINE AND ASSEMBLE THE MAST

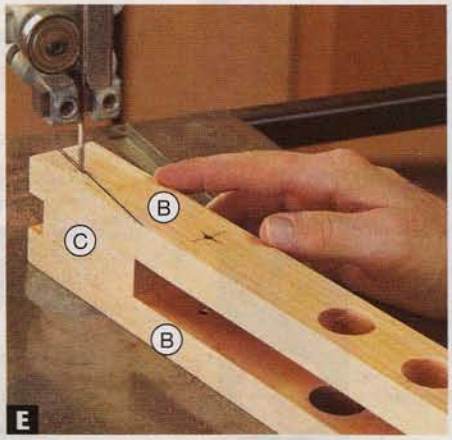


Join the two mast sides (B) with double-faced tape, mark the 1" hole centers, and drill through both parts.

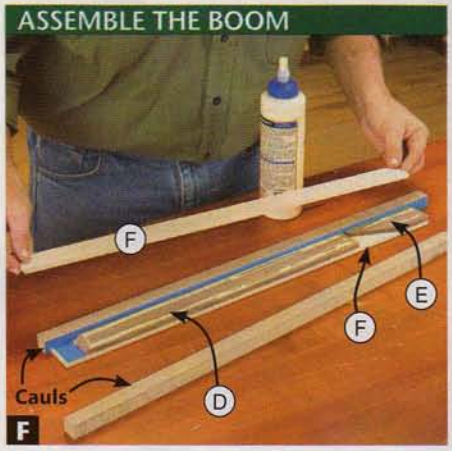


Apply glue and position the mast spacers (C) on one mast side (B). Apply glue and add the second mast side.

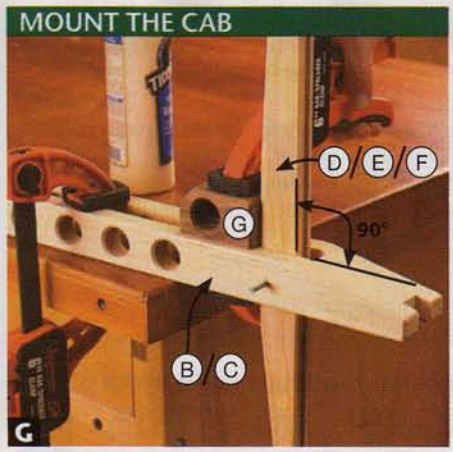
Clamp the parts between the cauls, and then clamp vertically. Keep the mast sides (B) and lower mast spacer (C) flush at the bottom.



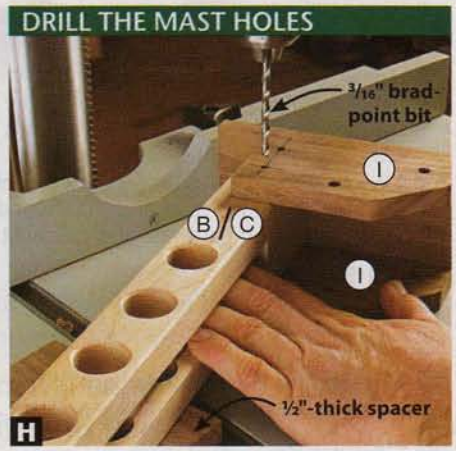
With the glue dry, remove the clamps and cauls, mark the bevel at the top of the mast, and bandsaw it to shape.



As with the mast, cut ¾x¾x24" cauls, applying masking tape, to align the spacers (D, E) between the boom sides (F) for gluing.

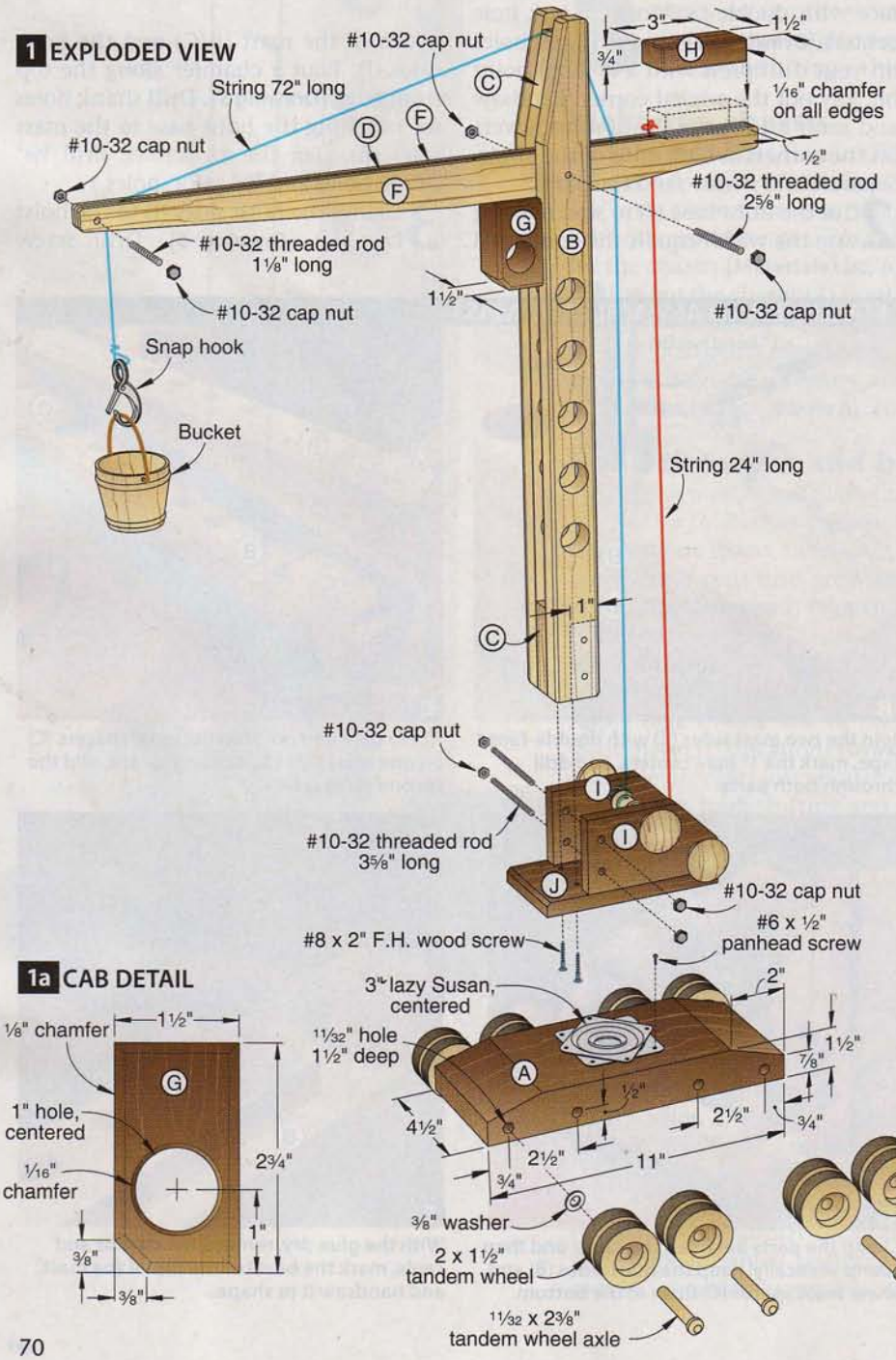


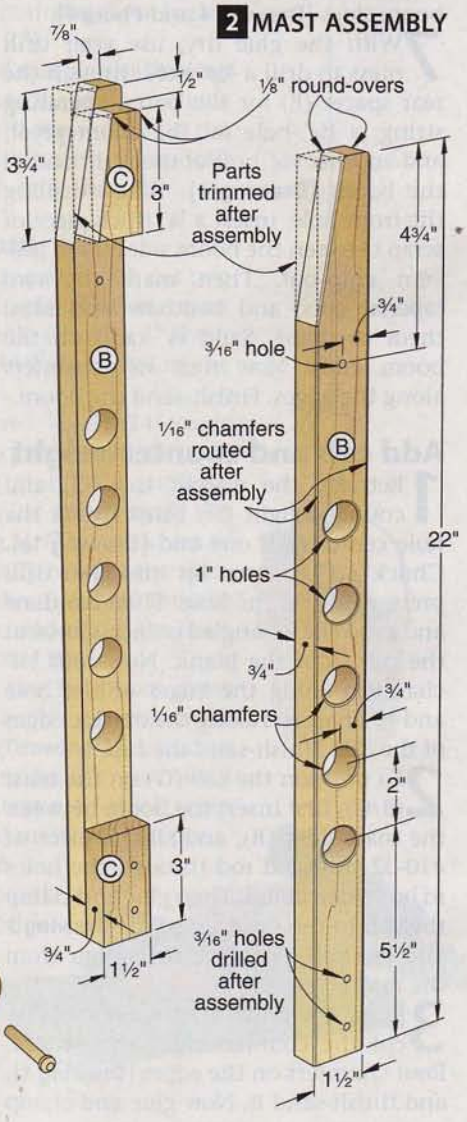
Sparingly apply glue to the cab (G), position it against the boom (D/E/F), centered on the mast (B/C), and clamp the cab in place.



Using the holes in the hoist side (I) as guides, drill 3/16" holes for the threaded rod through the mast (B/C) with a brad-point bit.

holes, and drive the screws. (For #6 screws, drill 9/64" shank holes and 3/32" pilot holes.) Clamp the mast (B/C) between the hoist sides. Using the screw holes in the hoist base as guides, drill pilot holes into the mast sides (B), and

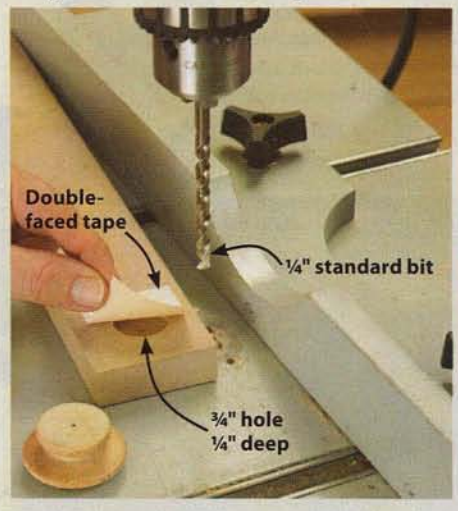


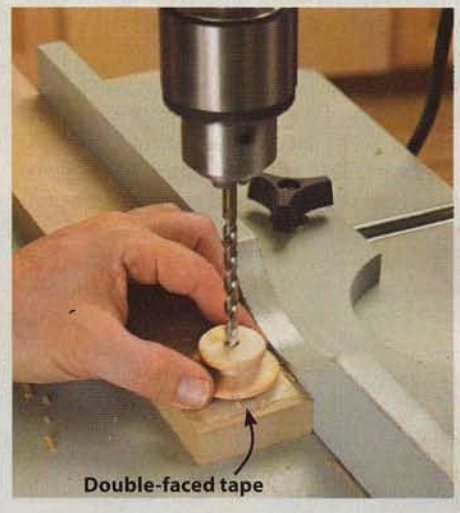


SHOP TIP

How to safely hold rounded objects for drilling

Enlarging the screw holes in the wood knobs for the hoist assembly presents two challenges: holding a part with a domed surface steady on the drill-press table, and keeping it from spinning as the drill bit bites into the surface. Here's an easy way to overcome both. Drill a ¾" hole ¼" deep in a piece of ¾"-thick scrap. Place a 1½×1½" piece of double-faced tape over the hole, as shown at *right*. Center the knob over the hole, and press down firmly. Now support the scrap with the drill-press fence, centering the bit on the knob screw hole, and drill, as shown at *far right*. This method also works for drilling into wood balls.





drive the screws. Now, on your drill press, drill 3⁄16" holes through the mast [**Photo H**].

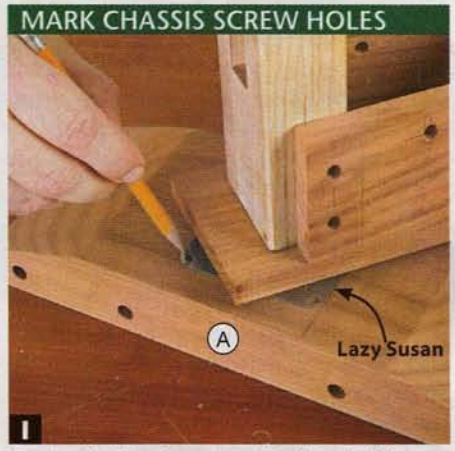
4 With the mast/hoist assembly upside down, position the lazy Susan on the hoist base (J) equidistant from the front and side edges. Drill pilot holes, and drive the screws [**Drawing 1**]. Then position the mast/hoist assembly on the chassis (A), and mark the lazy Susan screw-hole locations [**Photo I**]. Now remove the mast/hoist assembly, and drill the holes.

5 Cut two 4"-long pieces of ¼" dowel, and glue a spool onto each piece, centered on the length [**Drawing 5**]. With the glue dry, drill a 3⁄32" hole, centered, through each spool and dowel.

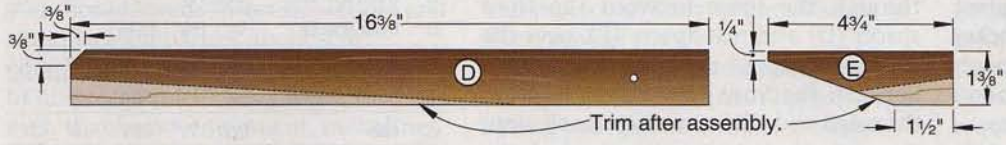
6 Enlarge the screw holes in four 1¼"-diameter wood knobs to ¼", drilling them ⅜" deep. To hold the knobs on the drill press, see the **Shop Tip** *above*.

Apply finish and assemble

1 Remove the lazy Susan, mast (B/C), and hoist sides (I) from the hoist base (J). Examine all parts and assemblies, and finish-sand where needed. Slide the wheels and bucket onto a ¼" dowel, and support it at the ends with 2×4 scraps. To hold the axles and keep finish off the ends for gluing, drill eight ⅜" holes into a 2×4 scrap and insert the axles. Drill six ¼" holes at least 2" apart into another scrap block. Insert short pieces of ¼" dowel into four of the holes,

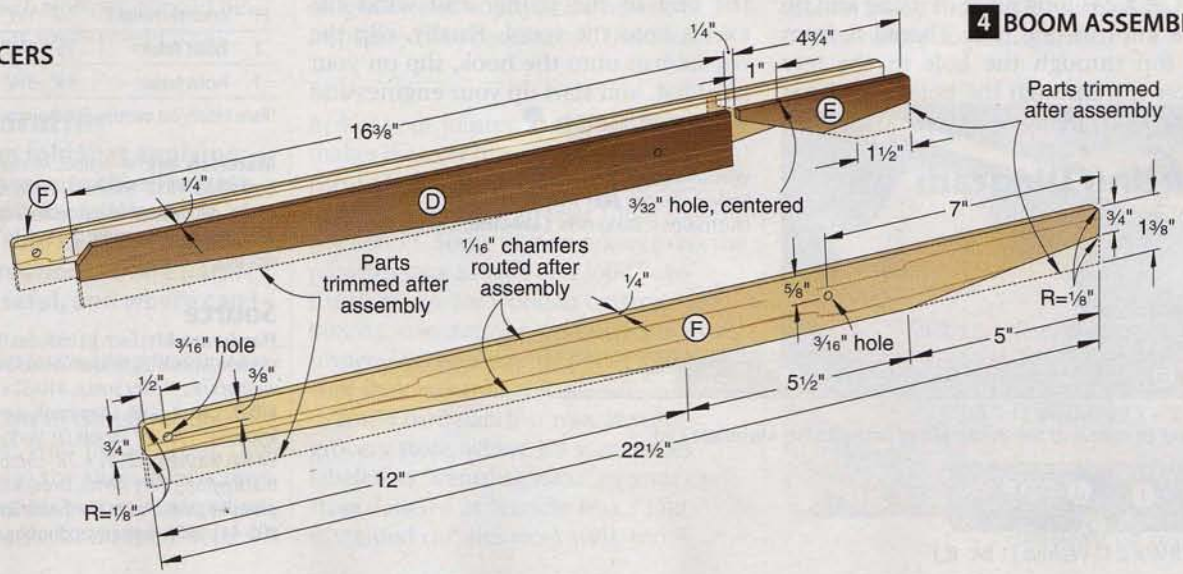


Center the lazy Susan on the chassis (A), rotate the mast/hoist assembly to uncover the mounting holes, and mark the locations.



3 BOOM SPACERS

4 BOOM ASSEMBLY



and press a knob onto the end of each one. Wrap masking tape around one end of each spool dowel, and insert the other end into one of the remaining holes. Apply a clear finish to all the parts and assemblies. (We applied four coats of aerosol satin lacquer, sanding between coats with 320-grit sandpaper. To smooth the wheels between coats, use a soft brass wire brush.)

2 Slide a wheel and washer onto each axle. Glue the axles into the chassis (A) holes, inserting business cards between the wheels and washers to ensure free spinning.

3 Screw one hoist side (I) to the hoist base (J) [**Drawing 5**]. Slip a washer, spring, and another washer onto each spool dowel, and insert the dowels into the hoist side holes. Slip another washer, spring, and washer over each dowel, and fasten the second hoist side in place, capturing the spool dowels within the hoist side holes. Add a washer to each dowel protruding from the hoist sides, and glue the knobs onto the dowels.

4 Screw the mast (B/C) to the hoist base. Cut two 3⅝"-long pieces of #10-32 threaded rod (⅜" longer than the total thickness of the assembly), and slide them through the hoist sides (I) and mast [**Drawing 5**]. Apply medium-strength thread locker to the rod ends, and thread on cap nuts. Screw the lazy Susan to the hoist base (J), and then to the chassis (A).

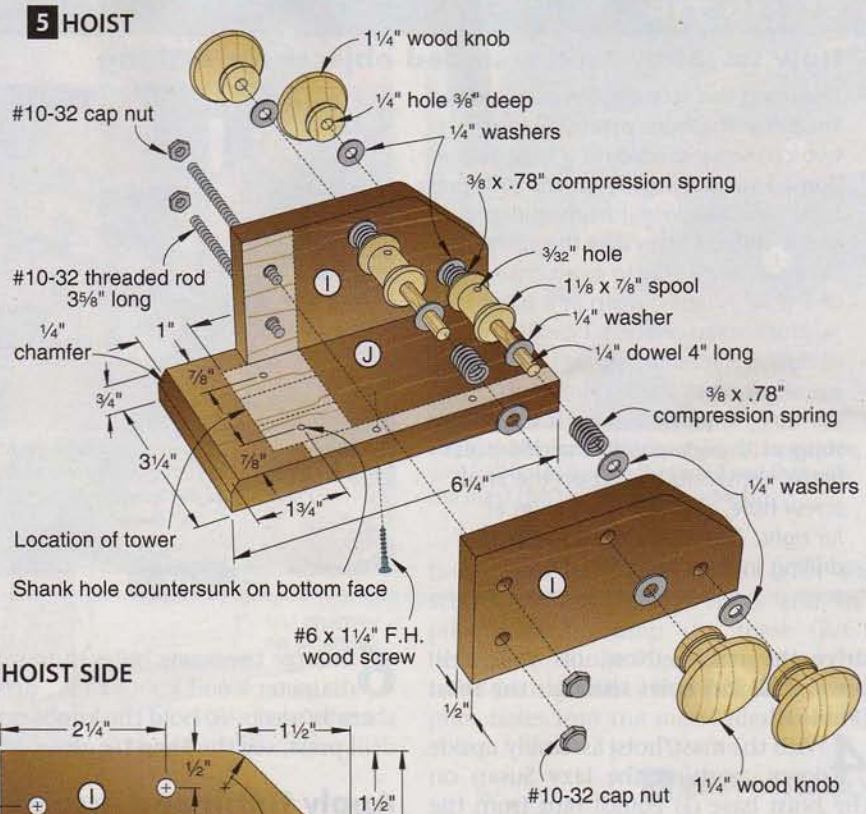
5 Cut one 2⅝"-long and one 1⅛"-long piece of threaded rod. Slide the boom (D/E/F/H) between the mast sides (B). Slide the long rod through the pivot holes [**Drawing 1**]. Apply thread locker and cap nuts. Slide the short rod through the holes at the front end of the boom, and apply thread locker and cap nuts.

6 Cut a 24"-long piece of string and tie a knot in one end. Thread it from the top through the hole in the rear spacer (E), through the hole in the rear spool, and then tie it off. Wind the excess cord onto the spool by turning the knobs.

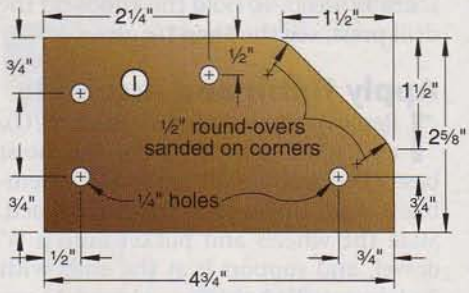
7 Cut a 72"-long piece of string, thread it through the hole in the front spool, and tie it off. Then route the cord through the space between the front spacer (D) and rear spacer (E), over the top of the upper mast spacer (C), and between the front spacer and the front threaded rod. Tie the snap hook onto the end of the string, and wind the excess onto the spool. Finally, clip the bucket bail onto the hook, slip on your hard hat, and start up your engines and your imagination.

Written by **Jan Svec**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

5 HOIST



5a HOIST SIDE



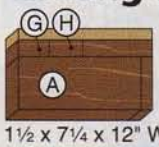
Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	chassis	1½"	4½"	11"	W	1
B*	mast sides	¾"	1½"	22"	M	2
C*	mast spacers	¾"	1½"	3"	M	2
D*	front spacer	¼"	1⅜"	16⅜"	W	1
E*	rear spacer	¼"	1⅜"	4¾"	W	1
F	boom sides	¼"	1⅜"	22½"	M	2
G*	cab	1½"	1½"	2¾"	W	1
H*	counterweight	¾"	1½"	3"	W	1
I	hoist sides	½"	2⅝"	4¾"	W	2
J	hoist base	¾"	3¼"	6¼"	W	1

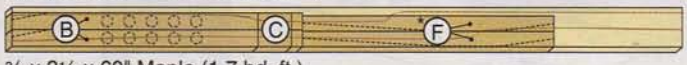
*Parts initially cut oversize. See the instructions.

Materials key: W–walnut, M–maple.
Supplies: #8×2" and #6×1¼" flathead wood screws, #6×½" panhead screws, double-faced tape.
Bits: 45° chamfer router bit; 3⁄16", ¼", and 11⁄32" brad-point drill bits; 1" Forstner bit.

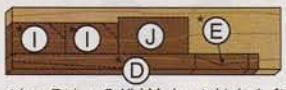
Cutting Diagram



1½ x 7¼ x 12" Walnut (1.3 bd. ft.)



¾ x 3½ x 60" Maple (1.7 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



¾ x 5½ x 24" Walnut (1 bd. ft.)

Source

Hardware kit: Each kit includes the following parts: tandem wheels (8), tandem wheel axles (8), ⅜" flat washers (8), 3" lazy Susan, #10-32×12" threaded rod, #10-32 cap nuts (8), snap hook, wood bucket, 1¼" birch knobs (4), 1⅛×⅞" spools (2), ¼×9½" wood dowel, ¼" flat washers (12), ⅜×.78" compression springs (4), black nylon string (14 ft.). Order kit no. 3122, $24.99, plus shipping. Meisel Hardware Specialties, 800-441-9870, meiselwoodhobby.com.

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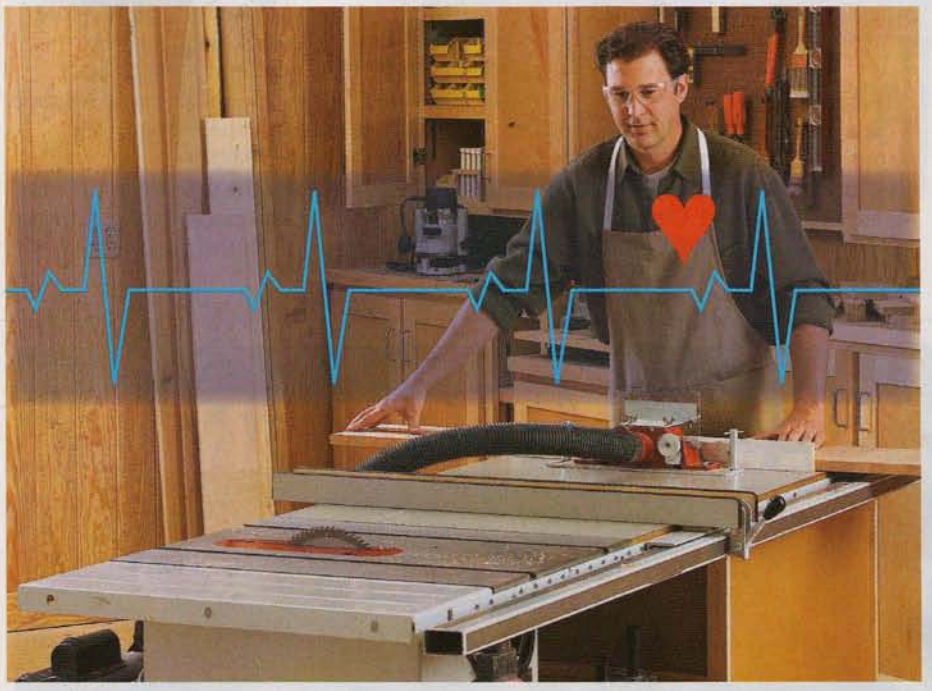
Heart-smart woodworking

Q: I recently had a pacemaker put in and, according to my doctor, I can't get within two feet of my power tools. How do I save my hobby and my health?

—Al Lakatos, Brighton, Mich.



A: Al, as a bunch of woodworkers, we wouldn't dream of offering medical advice. And we hope that you wouldn't dream of straying from the advice of your doctor, who is, after all, the person closest to your case and most knowledgeable about your medical history and physical condition.

However, we can certainly sympathize with your situation, so we posed your question to Dr. Henry Halperin, M.D., M.A., professor of medicine in Cardiology at Johns Hopkins School of Medicine. His advice: Ultimately, follow your doctor's orders, but you should also be an active partner in your own health care. Take specific questions to your doctor after compiling careful research about your power tools and your pacemaker.

For example, Medtronic, the world's largest manufacturer of pacemakers, gives specific guidelines about which electrical devices are safe and which you should avoid: "Most household and workplace appliances, tools, and equipment can be used with minimal or no precautions." They warn, however, that heavy equipment, including arc welders and chainsaws, should be avoided, and that some power tools require safety measures to ensure proper functioning of a pacemaker, such as keeping the tool a minimum of 6" from the pacemaker.

"For more modern devices," Dr. Halperin says, "[electrical interference is] much less of an issue. They're very well-protected. They've got all kinds of filters against interference."

If you and your doctor need more information, Dr. Halperin suggests having your doctor contact the cardiologist or electrophysiologist who implanted the pacemaker. Have your doctor contact the manufacturer for the specific limitations of your device.

In the end, Dr. Halperin says that with your doctor's guidance, a balance can be struck. "It's a question of quality of life versus safety."

And don't forget that woodworkers got along just fine for many centuries prior to the discovery of electricity and the invention of power tools. However, do keep in mind that hand tools will require more exertion on your part, so discuss using those, too, with your doctor before acquiring them.

Versatile paraffin

Q: I've been told that applying paraffin wax to the elevation screws on my planer will make it easier to raise and lower. What are some other situations where paraffin might be useful, and where can I find it?

—Tom Mullen, West Branch, Mich.

A: In addition to the elevation screws on your planer, Tom, rub paraffin wax onto the threads of screws to make them easier to drive into wood. Applying an even coat on the infeed bed of your jointer, as shown at *right*, makes it easier to run your workpiece through at a constant rate. Rub some onto your wooden drawer slides to ease the action. Some woodworkers even use paraffin wax as part of a food-safe-finish recipe for wooden cutting boards, countertops, and utensils. Heat mineral oil in a double boiler and melt wax shavings into the oil.

You'll find paraffin wax at your grocery store, where it's sometimes labeled as "canning wax," or your craft store, labeled as "candle wax." Old, discarded candles work well, too.

continued on page 74

Curing glue-clogged clamps

Q: I lent a friend four clamps to glue up a large project. They came back with dried yellow glue globs on the bars that he couldn't get off. What's the best way to remove glue that's hardened?

—George Noeth, Fort Mill, S.C.

A: You've got a couple of options for removing dried glue from clamps, George. For thin deposits, spray on a citrus-based cleaner, such as Citrus Magic or Polyken 41 Citrus Cleaner. Allow it to soften and swell the glue for a few minutes before removing it with a plastic scraper. When you're finished, use detergent and water to remove the cleaner. For more stubborn deposits, use a hair dryer or heat gun on the high setting to soften the glue before scraping it off, as shown at *right*.

Next time you lend a friend your clamps, throw in a roll of painter's tape. Tell him to adjust the clamp jaws during dry assembly, and then mask the bar between the jaws with the tape before gluing and clamping. Any drips will come off with the tape.

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Stopblocks ensure a square frame

Q: I want to use my mitersaw to miter-cut four pieces of 1×4" stock to the same length for a square frame. How can I do that precisely?

—Henry Long, Benbrook, Texas

A: First give your mitersaw a tune-up, Henry. Following the manufacturer's instructions, adjust the saw to produce dead-on 45° cuts at both settings. Begin making the frame by cutting a 45° miter on one end of each frame piece about 4" longer than the final size. Now rotate the blade to cut the opposite 45° angle.

Attach one of the miter cut-offs to a 1×2" piece of scrap roughly as long as the frame pieces to create a combination stopblock/hold-down, as shown *below*. Clamp the stopblock to the mitersaw fence at a distance equal to the final length of the frame parts. Butt the mitered end of each part firmly against the mitered stopblock, and cut the second miter.

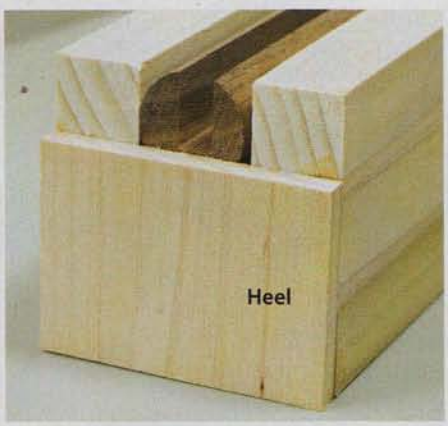
Make groovy dowels

Q: I want to cut a ¼" groove along the 3' length of a ¾"-diameter dowel. Can I do this with my table-mounted router?

—Stew Levine, West Orange, N.J.

A: A simple jig should solve your problems, Stew. In a piece of wood about 2" square and at least as long as your dowel, cut a centered groove that's as wide and deep as the dowel's diameter. The fit needs to be tight enough that the jig holds the dowel in place. Then add a heel at one end, as shown *below*. The heel becomes especially important when grooving dowels shorter than 12".

For added grip, place strips of double-faced tape on the bottom of the groove before inserting your dowel with one end resting against the heel. Then chuck a ¼" slot-cutting bit into your table-mounted router and adjust the height to the center of the dowel within the jig resting on its side, as shown at *bottom*. Adjust the router table fence to control the depth of cut. Test your settings on 2"-square scrap to center the cut; then make passes up to ¼" deep each until you reach the desired groove depth.



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Ask WOOD

Doweling 101

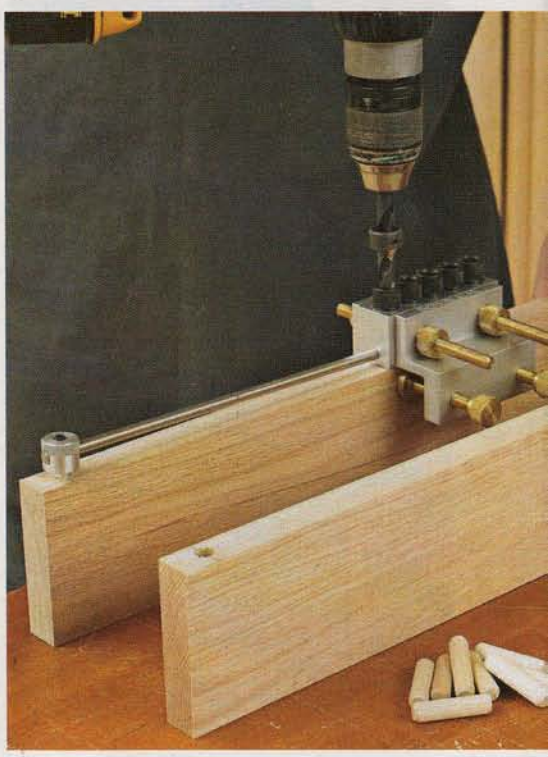
Q: Is there a list of tried-and-true doweling rules? I want to edge-join a pair of ¾×7×48" ash boards for rocking horse rockers. How close to the ends can I place dowels, and how far apart can I space them?

—Charlie Stopcynski, Lawrenceville, Ga.

A: We recommend making that first hole about ¾" from the end, as shown *below*, to avoid breaking out the end grain while muscling loose a dry-assembled joint in preparation for a glue-up.

For edge-gluing, the dowels align the pieces and keep their surfaces flush more than reinforce the joint. So space the dowel holes just close enough to correct any minor warping of the parts. For most edge joints, space the dowels roughly 10" apart, advises Jim Lindsay of O.M.S. Tool Co., maker of the Dowelmax doweling jig. Because you're cutting rockers from your glue-up, you'll also need to position the dowels away from your cutlines.

As for dowel diameters, use dowels half the thickness of the stock you're joining. For example, use ⅜" dowels for ¾" stock, and ¼" dowels for ½" stock. Drill each dowel hole 1/16" longer than half the dowel's length —usually 1½" or 2" for precut dowels—to ensure a tight fit and allow space for trapped glue.



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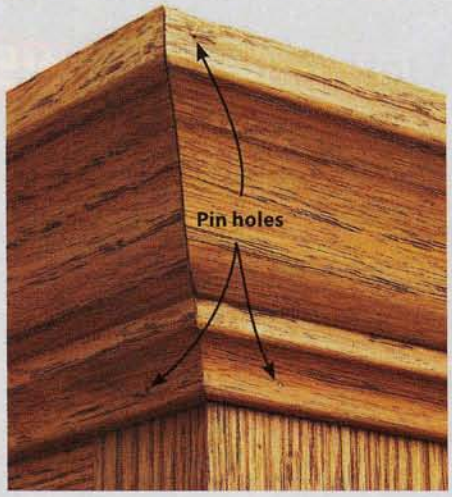
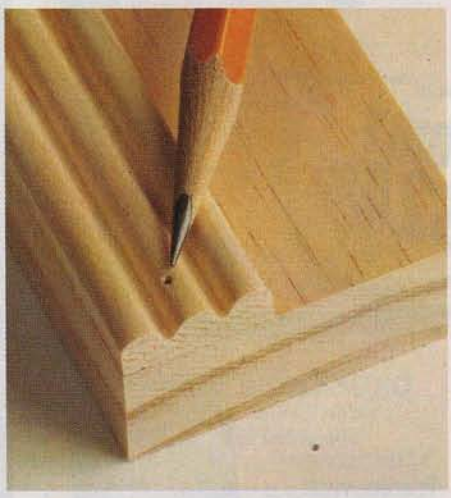
Two new pinners go 2" deep for mounting moldings

Many times, we've attached crown moldings to cabinets or walls, and in the past, used glue and brads. But the job was never finished until the brad holes were filled, and the colors matched. New 23-gauge pin nailers from Cadex and Grex sink headless pins up to 2" long and leave holes so small, they require little filler. If you drive the pins into the grain lines, you likely won't even need to fill the holes.

But can pin placement be that exact? It is with these models. Achieving that precision, though, requires that the manufacturer remove the safety mechanism from the nose. So to maintain safety, these pinners have two triggers: Both must be depressed to fire a pin. Although it's a simple procedure, be warned that these pinners will fire *anytime* you press both triggers. So get into the habit of placing the nose on your workpiece before pulling the triggers.



The unfilled pin holes in this red oak crown molding are nearly undetectable.



We attached this thin pine molding with a pin because it doesn't split the molding.

In testing these pinners, we found both could drive 2"-long pins through oak molding and into a wall frame with no trouble. (You'll need to use adhesive to help hold the molding long-term.) They also buried full-length fasteners into solid white oak and hard maple, although a few stood slightly proud when our compressor's air pressure dipped below 100 psi, or when we relaxed our downward pressure on the pinner.

Both pinners feature dry-firing protection should the pins run out—preventing drive-pin damage—but the Grex goes a step further. It locks out firing with about six pins left. (There's also an override if you need to fire a few more before reloading.) They each include a viewing window in the magazine, a belt hook, rear air exhaust, and a durable carrying case. But the Grex fires pins as short as ½", and features directional marks on the pins that prove helpful when reloading. Besides pins, the Cadex also fires 23-gauge brads (essentially a headed pin), shoots pins as short as ⅝", and has a swiveling air coupler for maneuverability.

—Tested by Jeff Mertz and Erv Roberts

Model P650L

Performance	★★★★☆
Price	$340

Grex Power Tools
888-447-3926; grexusa.com

Model CPB23.50

Performance	★★★★☆
Price	$300

Cadex Tools
604-876-9909; cadextools.com

Power Bore bits clear chips for faster, cooler drilling

This is one of those "Why didn't I think of it?" products. Rockler's Power Bore drill bits clear chips much faster than ordinary twist bits or brad-point bits, while still cutting crisp, precise holes. These bits remind me of those inside hollow mortising chisels. Each has a centerpoint for accurate placement, a single shear-spur to cut the hole, and steeply angled flutes that evacuate chips from inside a hole without plugging.

I drilled multiple holes into 2"-thick red oak and hard maple with the Power Bore bits as well as standard twist bits and brad-point bits of the same diameter. The Power Bore bits never plugged, and I didn't once have to back them out of the holes. By comparison, I could go only 1" deep with the brad-point bits and ¾" deep with the twist bits before plugging the flutes. No plugging means less heat buildup that dulls the bits.

The nine-piece set comes in a plastic storage case and contains the following sizes (in inches): ¼, 5/16, ⅜, 7/16, ½, 9/16, ⅝, 11/16, and ¾.

—Tested by Pat Lowry

Power Bore Drill Bit Set, model 31345

Performance	★★★★★
Price	$68

Rockler
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continued on page 80

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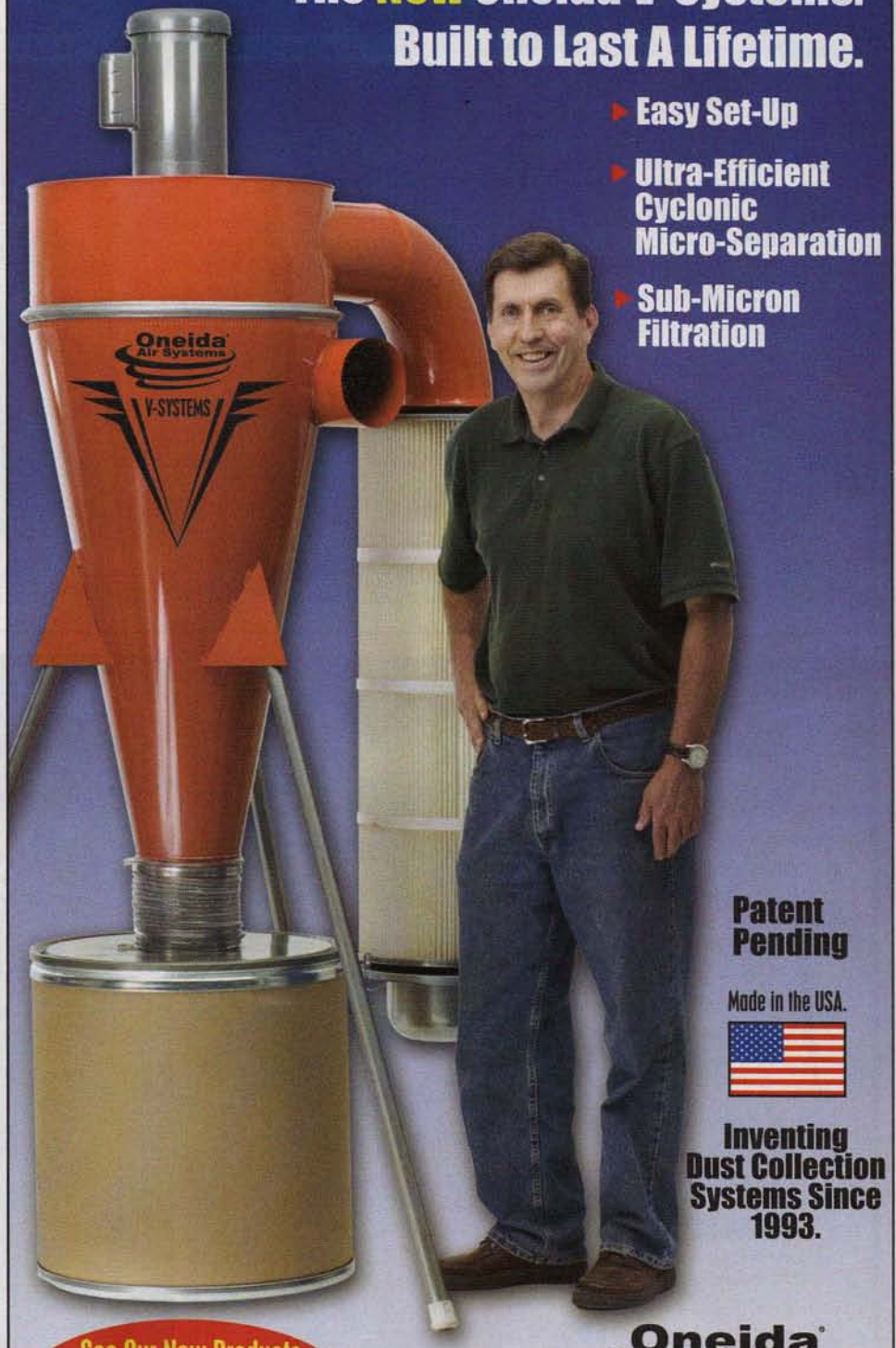

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Low-cost, low-speed 6" grinder proves a perfect fit for turners

I've long searched for an inexpensive 6" slow-speed (1,725 rpm) grinder for sharpening my turning tools. Problem was, all the 6" grinders I found either had 3,450-rpm motors—way too fast for sharpening lathe chisels and other hand tools—or their bases were too wide for mounting my Wolverine sharpening jig.

Grizzly Industrial has solved that problem with its H8126 low-cost, slow-speed 6" grinder. This pint-size grinder has all the power you'll need to sharpen lathe tools, wood chisels, and plane irons. (Its ¼-hp motor is a little on the light side for sharpening lawn-mower blades.) I like that it comes with two aluminum-oxide wheels: one ¾" wide and 36 grit, and the other 1½" wide and 100 grit. With the 100-grit wheel, I can sharpen wide tools without having to slide them side-to-side on the narrow wheel. Add $15 for a diamond dressing tool to flatten the wheels, and you'll have sharp tools in no time.

—Tested by Jan Svec

6" Bench Grinder, model H8126

Performance	★★★★★
Price	$80

Grizzly Industrial
800-523-4777; grizzly.com

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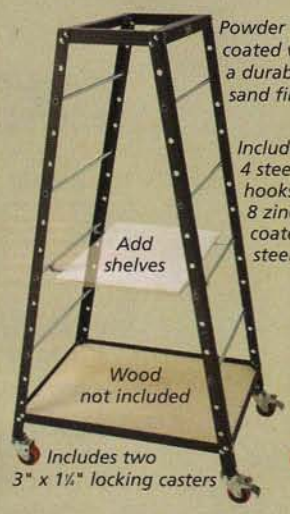
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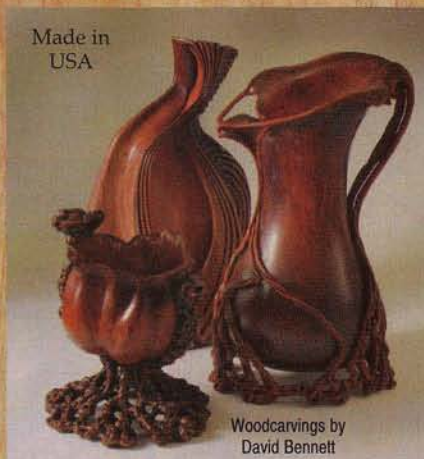

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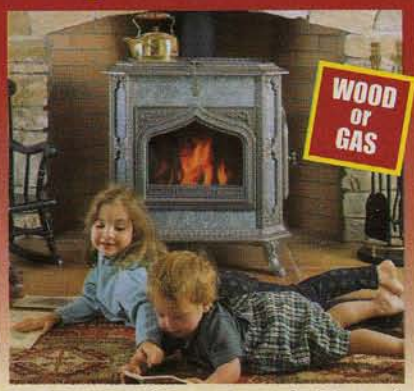

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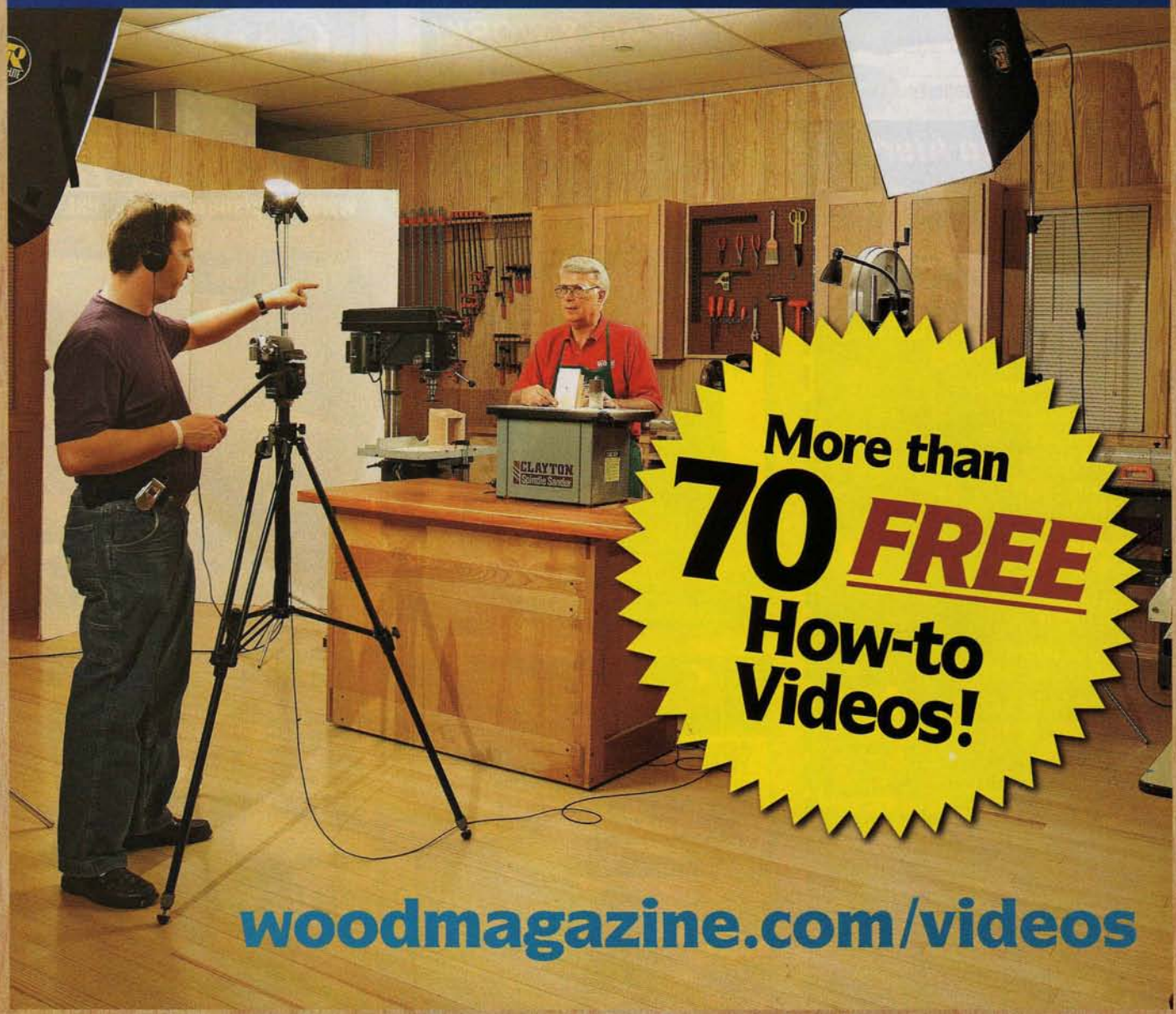

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What's Ahead

A sneak peek inside the October issue (on sale August 26)

FEATURED PROJECT

Flat-screen entertainment center
This easy-to-build table puts a flat-screen TV at the right height for viewing, with storage for components. You'll also find instructions for matching coffee and end tables.

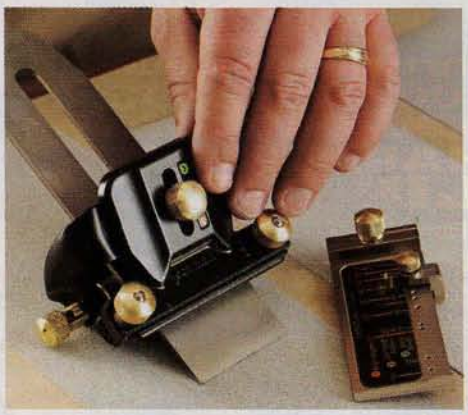
Quilt Rack
Display several quilts in minimal floor space with this no-nonsense rack. It quickly disassembles for storage or transport.

Wood car
Is it possible to build a wooden car that will go 240 miles per hour? Discover how a crew of North Carolina craftsmen are making this dream a reality.

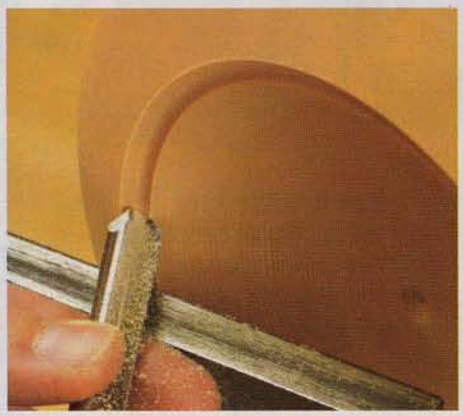
Chinese checkers
Build this project in just a weekend for years of fun-filled family entertainment. A simple router template makes child's play of accurately placing the marble recesses.

TOOL TEST

Random-orbit sanders
Our head-to-head trials of 12 popular machines reveal the ones that best combine aggressiveness and comfort with a fine finish.



Sharpening systems compared
We take a look at three types—honing guides (shown *above*), as well as powered dry and wet machines—to uncover what's best for you.



How to use a bowl gouge
Interested in turning a bowl? Learn how to choose, sharpen, and effectively manipulate the tool that will help you get the job done right.

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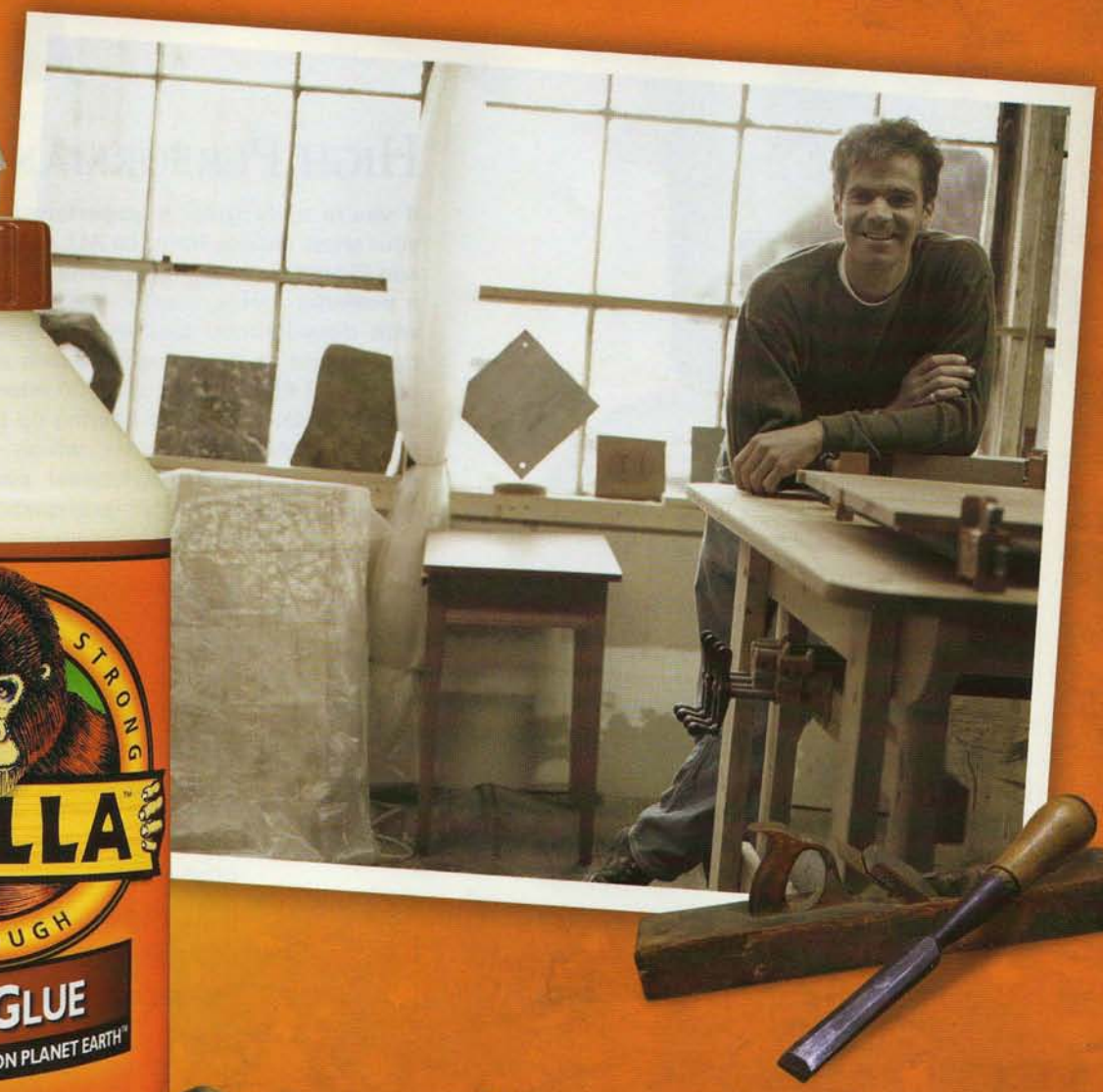

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